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HIGH-ALTITUDE NUCLEAR DETONATION
OPTICAL-INFRARED EFFECTS (U)

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| 3.712 | Photometer (narrow-band visible) results from all stations, Tight Rope ----- | 389 |

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CHAPTER 3 RESULTS (Continued)

3.5 KING FISH

3.5.1 Spatial Radiometer (Section 2.2.2). Data are presented in Figures 3.360 through 3.426.

During King Fish, detectors 10, 11, 12, and 13 were disconnected, the channels once again forming the low sensitivity components of channels 3, 5, 7, and 21 on both systems.

All channels operated normally on both systems. On the system on board Kettle I, the silicon filter was in position from H + 0 to H + 14 seconds. After that time the germanium and silicon filters were sequenced at one-minute intervals.

On the system on board Kettle II, the silicon filter was in position from H + 0 to H + 28 seconds. After that time the normal germanium-silicon sequence started.

GROUP 1
Excluded from automatic downgrading
and declassification

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3.5.2 Filter Photometer (Section 2.2.3). The 5.0- and 2.7-micron data taken during this event was all of a very uniform nature. All photometers recorded signals which began at high levels and decayed to background levels after about $H + 60$ seconds for the 5.0-micron data, and $H + 40$ seconds for the 2.7-micron data. Apparent sky radiances for both wavelengths are given in Figures 3.427 and 3.428. Right rolls of the aircraft are seen in the 5.0-micron data after about $H + 130$ seconds.

3.5.3 Image Dissector (Section 2.2.4). Spectral data were obtained at the Kettle I station on this shot. The unit appeared to malfunction during the period $H + 15$ to $H + 100$ msec. At about $H + 100$ msec it appears that the operation of the instrument was normal. Absolute levels after $H + 15$ msec are suspect and, hence, not presented.

Figure 3.429 presents a spectrogram taken at $H + 15$ msec, and Figure 3.430 shows the decay of the 4,925- and 4,578-Angstrom bands. Radiant equivalent saturation levels are also presented in Figure 3.430. These figures are uncorrected for window transmission and pointing (see Table E.2).

Figure 3.431 presents a spectrogram taken at $H + 100$ msec. This has not been corrected for system

response versus wavelength; hence, it should not be considered as a relative spectrum.

Data were acquired at the Kettle II station but are unreduced as yet.

3.5.4 Dispersion Units (Section 2.2.5). The systems on both aircraft were beset with difficulties on this shot. On Kettle I, high voltage to the amplifier rack was lost apparently due to overheating caused by continuous operation during the many holds. On Kettle II three amplifiers became extremely noisy. There were coupling problems on many of the remaining data channels.

It is possible, however, that there are some channels with very low amplitude signals available. This is being investigated at present.

3.5.5 Filter Wheel Radiometer R4K1 (Section 2.2.6). Data were obtained at the Kettle I station in the following bands: 1.55 - 1.615, 1.62 - 1.93, and 1.87 - 2.56 microns. Figures 3.432 through 3.434 present irradiance at the aircraft, corrected for window transmission.

On this event the radiometer tracked the yellow-green glow after H + 200 seconds. At this time the fireball had risen and faded.

3.5.6 PbS Radiometer (Section 2.2.7). The radiometers (with the exception of the one at Maui) were pointed at the 70-km altitude level at angles ranging from 24 to 41 degrees from the detonation point. The data (Figure 3.435) appeared highly variable, because the instruments were not pointing at the original detonation position and viewed the green glow only at later times. The region of sky toward which the Kettle I, Kettle II, and Johnston Island instruments were pointing was still a factor of ten brighter than the natural background at $H + 1,000$ seconds. At this time the readings started to fall off. At Maui, the signal dropped down to background at about $H + 3$ seconds, but rose again as the fireball rose through the instrument field of view (see Figure 3.435).

3.5.7 Automatic Scanner Photometer (Section 2.2.8). This instrument aboard Kettle I, obtained data for more than 4,000 seconds in the following spectral bands:
0.373 - 0.396, 0.420 - 0.456, 0.358 - 0.558, 0.521 - 0.567,
and 0.590 - 0.613 micron.

Contours of isobrightness in the above-mentioned spectral bands are presented in Figure 3.436 through 3.610.

The signal-to-noise ratio of the normal sky background scans, before time zero, was extremely low. Only

the 0.358- to 0.558-micron scan produced signal levels high enough to be reduced.

3.5.8 UV Spectrometer (Section 2.2.9). The instrument aboard Kettle I acquired data in the spectral region from 2,800 to 3,800 Angstroms for approximately 50 seconds after detonation. Radiating bands are identifiable at 3,160, 3,365, and 3,550 Angstroms.

A typical spectrogram, taken at H + 34 seconds, is presented as Figure 3.611. This spectrum is uncorrected for phototube response versus wavelength. The decay of the band centered at 3,550 Angstroms is presented in Figure 3.254.

3.5.9 Cameras (Section 2.2.11). A total of 26 photometric cameras acquired data on this shot. The total photographic coverage inventory is presented on the next page.

| <u>Number and Type of Camera</u> | <u>Exposures/Camera</u> | <u>Type Film</u> |
|--------------------------------------|-------------------------|------------------|
| <u>Kettle I</u> | | |
| 2 Nikon 35 mm | 36 | Tri-X |
| 2 Nikon 35 mm | 36 | Super Ansco |
| 1 All-Sky | 1,000 | Super Ansco |
| 1 All-Sky (limited operation) | 50 | Tri-X |
| 1 Streak | 6 feet | Tri-X |
| <u>Kettle II</u> | | |
| 3 Nikon 35 mm | 36 | Super Ansco |
| 1 Nikon 35 mm | 36 | Tri-X |
| 1 70 mm | 200 | Tri-X |
| 1 All-Sky | 1,000 | Super Ansco |
| 1 All-Sky (limited operation) | 50 | Tri-X |
| 1 Streak | 6 feet | Tri-X |
| <u>Maui</u> | | |
| 1 Nikon 35 mm | 36 | Super Ansco |
| 1 Robot 35 mm | 36 | Tri-X |
| 1 All-Sky 16 mm | 500 | Tri-X |
| 2 Streak 35 mm | 6 feet | Tri-X |
| 1 Argus (hand operated) | 3 feet | Tri-X |
| <u>Johnston</u> | | |
| 1 Nikon 35 mm | 36 | Super Ansco |
| 1 All-Sky 16 mm | 300 | Tri-X |
| 1 All-Sky 16 mm | 300 | Super Ansco |
| 1 Streak 35 mm | 3 feet | Tri-X |
| 1 Streak 35 mm | 6 feet | Tri-X |

Figure 3.612, reproduced from a 35-mm color photograph, shows the bright fireball, aurora, red air shock, and a green shock extending down from the fireball. In the two frames of Figure 3.613 (also from 35-mm color), the remains of the white fireball were aligned with the magnetic field and took on the now-familiar auroral blue cast. The yellow-green glow below the fireball position had become the principal visible feature. Figure 3.614 (also from 35-mm color) shows two 25-second exposures of this persistently glowing volume, which remained bright and could be photographed for over an hour after detonation.

The rise of the fireball and the development of the red air shock are shown in Figures 3.615 to 3.618 (35-mm Eastman Tri-X). There is also a single photograph of the red air shock taken through a 6,300-Angstrom interference filter (of halfwidth 90 Angstroms). The photographic image of the shock has faded into the background at $H + 180$ seconds. In Figure 3.618 the remains of the original fireball, which appeared white from Maui, were seen lined up in the general direction of the magnetic field. The field lines above Johnston appeared nearly horizontal in such an over-the-horizon projection.

Figure 3.619 shows the apparent dimensions of the air shock, as seen in the Maui photographs (there are more data, still unreduced, on other photographs). The faster Tri-X film showed a larger shock-front radius after $H + 100$ seconds than does the Super Anscochrome; this not-unexpected effect suggests that the Tri-X data should be used in computations of shock speed.

3.5.10 Photometer (Section 2.2.12). In the infrared, the photometers at Johnston Island and the two aircraft stations showed signals 100 times background at $H + 100$ seconds (Figure 3.620). The fluxes fell rapidly for 250 seconds, and then very slowly to 3 times background at approximately $H + 1,500$ seconds. A strong signal, with a second maximum which was presumably due to the fireball rising over the horizon, was recorded at Maui.

In the visible region of the spectrum (for which only fragmentary results are presented in Figure 3.620), the photometers show strong signals up to $H + 250$ seconds and a very slowly decaying signal ten times background at one hour. Data for $H + 1,000$ seconds—at which time an elliptical yellow-green glow had appeared below the detonation—are shown in Figure 3.621.

The red air-shock skyglow, as seen from Maui, is documented in Figure 3.622.

3.5.11 Photomultiplier (Section 2.2.14.) The S-1 surface photomultiplier system on board Kettle II obtained the initial optical-IR pulse on this shot. The energy increased smoothly to a peak at approximately $H + 25 \mu \text{sec}$. The slope of the pulse was rather shallow as it crossed the oscilloscope triggering level. This makes the apparent time to peak, as reported above, shorter than the true time.

3.6 TIGHT ROPE

3.6.1 Spatial Radiometer (Section 2.2.2). The data are presented in Figures 3.623 through 3.689.

During Tight Rope, detectors 10, 11, 12, and 13 were again disabled to allow for low-sensitivity channels on detectors 3, 5, 7, and 21.

All channels functioned properly on the system on board Kettle I. On this system the silicon filter was in position from $H + 0$ to $H + 38$ seconds, at which time the normal filter frequencying started.

On the system on board Kettle II during Tight Rope the high-sensitivity channel 21 failed due to a malfunction in the tape recorder. All other channels operated normally. The silicon filter was in position from $H + 0$ to $H + 30$ seconds, at which time the normal filter sequencing started.

3.6.2 Filter Photometer (Section 2.2.3). All photometers on both aircraft functioned properly during this shot, but the resulting sky radiance data presented in Figures 3.690 and 3.691 are complicated by changing aircraft orientation. Telescopes Nos. 3 and 4 did not appear to see the fireball at all in their fields of view after about $H + 80$ seconds, while telescope No. 6 at the Kettle I station was still recording detectable signals even after $H + 140$ seconds. Details of techniques of separating out effects due to orientation are given in discussion in Chapter 4.

3.6.3 Image Dissector (Section 2.2.4). At the Kettle I station, continuum radiation was observed from $H - 0$ to approximately $H + 90$ msec. At this time, which corresponds roughly with the second maximum of the optical-IR pulse (see Section 3.6.4), radiating bands appear at 3,773, 4,026, and 4,278 Angstroms.

Spectrograms taken at $H + 91$ msec and $H + 200$ msec are presented in Figures 3.692 and 3.693. Figure 3.694 shows the decay of the above-mentioned bands from $H + 90$ to $H + 500$ msec. The intensities are uncorrected for window transmission and pointing. It should be noted in regard to these absolute intensities that

the Kettle I aircraft was badly misoriented at $H + 0$. No correction factor is available at this time for extrapolation back to burst point.

Data were also acquired at the Kettle II station but are unreduced as yet.

3.6.4 Dispersion Units (Section 2.2.5). The total irradiance of the prompt optical-IR pulse was obtained in each of four broad spectral bands until about $H + 1$ second at the Kettle II station.

The data, presented in Figures 3.695 through 3.698, are reduced only in a preliminary manner. Final reduction with the automatic a-d conversion system is being accomplished at present. These data have not been corrected for window transmission or pointing.

The expected first and second peak characteristic of low-altitude detonations were observed on this shot. The first maximum occurred at $H + 800 \mu\text{sec}$, the minimum at $H + 7 \text{ msec}$, and the second maximum between $H + 40$ and $H + 50 \text{ msec}$.

In the 0.29- to 0.40-micron region, there is a rather large discrepancy in the peak irradiance values reported by the two units (Figure 3.695). The NUV-4 values are considered the more accurate of the two, since at the

higher irradiance levels, NUV-102 was dangerously close to the non-linear operating characteristics of the photodiode. This would tend to be substantiated by the good correlation that is observed in the region of the minimum.

In the 0.50- to 0.75-micron region, data were obtained by two units at the Kettle II station. The intensity level at the second peak, however, was not obtained by the units on this aircraft. An estimate of the second peak intensity was made by examining RED-92 from Kettle I and obtaining the ratio of the first to second peak values. The second peak for RED 60 was then reconstructed by assuming the ratios to be constant.

Subsidiary structure on the leading edge of the first pulse was observed to behave in the following manner: There was a peak at $H + 30 \mu \text{ sec}$, a minimum at $H + 100 \mu \text{ sec}$, and a plateau from $H + 150$ to $H + 500 \mu \text{ sec}$, followed by the peak at $H + 800 \mu \text{ sec}$.

Data were also acquired on Kettle I but are not presented at this time.

3.6.5 Filter Wheel Radiometer R4K1 (Section 2.2.6).

All channels recorded signals which returned to background within 200 seconds after burst. Figures 3.699 through 3.704 present irradiance at the aircraft corrected for window transmission.

On this shot the radiometer tracked the fireball and the glowing purple toroid at later times.

3.6.6 PbS Radiometer (Section 2.2.7). The radiometers at the three nearby stations were pointed directly at the detonation (at Maui the detonation was 4.5 degrees below the horizon). These instruments showed an extremely intense pulse which came on-scale—a factor 10^3 above background—at about H + 30 seconds (Figure 3.705). The signal decayed by a factor of ten each 12 to 15 seconds at Kettle II and Johnston but appeared to go down more slowly from Kettle I. No signal was detected at Maui.

3.6.7 Automatic Scanner Photometer (Section 2.2.8). Data were obtained on this event and are currently being reduced.

3.6.8 UV Spectrometer (Section 2.2.9). The instrument aboard Kettle I acquired data for several minutes. Strong radiating bands were apparent in the vicinity of 3,155, 3,380, and 3,560 Angstroms. The intensity of the radiation remained fairly constant from H + 20 seconds to about H + 3 minutes. At this time it rapidly decayed. The same type of structure reappeared at approximately H + 6 minutes; however, the signal was about one fourth as intense as it was

at H + 3 minutes. This structure alternately faded and reappeared for about 30 minutes. Work is presently being carried out in an effort to determine the absolute levels of this apparent late-time UV source.

A typical spectrogram, taken at H + 88 seconds, is presented as Figure 3.706. This spectrum is uncorrected for phototube response versus wavelength.

3.6.9 Cameras (Section 2.2.11). A total of 25 photometric cameras acquired data on this shot. The total photographic coverage inventory is listed on the next page.

| <u>Number and Type of Camera</u> | <u>Exposures/Camera</u> | <u>Type Film</u> |
|--------------------------------------|-------------------------|------------------|
| <u>Kettle I</u> | | |
| 2 Nikon 35 mm | 36 | Super Ansco |
| 2 Nikon 35 mm | 36 | Tri-X |
| 1 70 mm | 100 | Super Ansco |
| 1 All-Sky 16 mm | 300 | Super Ansco |
| 1 All-Sky 16 mm | 300 | Tri-X |
| 1 Streak 35 mm | 6 feet | Tri-X |
| <u>Kettle II</u> | | |
| 2 Nikon 35 mm | 36 | Super Ansco |
| 2 Nikon 35 mm | 36 | Tri-X |
| 1 70 mm | 100 | Tri-X |
| 1 All-Sky 16 mm | 300 | Super Ansco |
| 1 All-Sky 16 mm | 300 | Tri-X |
| 1 Streak 35 mm | 6 feet | Tri-X |
| <u>Maui</u> | | |
| 1 Nikon 35 mm | 36 | Super Ansco |
| 1 Robot 35 mm | 36 | Tri-X |
| 1 All-Sky 16 mm | 500 | Tri-X |
| 2 Streak 35 mm | 6 feet | Tri-X |
| <u>Johnston</u> | | |
| 1 Nikon 35 mm | 36 | Super Ansco |
| 1 All-Sky 16 mm | 300 | Tri-X |
| 1 All-Sky 16 mm | 300 | Super Ansco |
| 1 Streak 35 mm | 3 feet | Tri-X |

The Maui films showed only an over-the-horizon flash in the first frame. At the aircraft and Johnston Island stations, the flux from the fireball—which was only 20 km away—was very high. Most of the frames were over-exposed during the first half minute. The growth of the toroidal fireball, its loss of structure, and its evolution into a small, progressively bluer cloud are shown in Figures 3.707, 3.708, and 3.709. A blue halo appeared around the central white fireball proper.

3.6.10 Photometer (Section 2.2.12). The infrared channels of the photometer (Figure 3.710) showed an extremely strong signal, about ten thousand times background, at $H + 30$ seconds. The fluxes decayed by a factor of ten each 10 to 20 seconds up to $H + 60$ seconds. Thereafter, the rate of fall-off decreased, and a weak signal was detected at $H + 400$ seconds. Only the initial, time-unresolved pulse was recorded at Maui.

The wide-band visible channel (Figure 3.711) showed a similar steep fall-off up to 50 seconds, which was followed by a more gradual decay. Correlated with the observed violet color of the late cloud, strong, slowly decaying, signals were observed at 3,914 (Figure 3.712)

and 4,278 Angstroms. These were still a factor of five above background at $H + 2,000$ seconds and presumably contributed a major part of the wideband photometer signal. Note that the flux near 3,914 Angstroms decreased nearly inversely with time ($1/t$); a similar behavior was observed at 4,278 Angstroms.

3.6.11 Photomultiplier (Section 2.2.14). The S-11 surface photomultiplier on board Kettle I obtained data on this shot. In the initial 200 μ sec of the optical-IR pulse (the period covered by the oscilloscope photograph), two maxima and a minimum were observed. The apparent times of the maxima are $H + 30$ and $H + 160 \mu$ sec and the minimum at $H + 80 \mu$ sec. In effect, these times are faster than was actually the case due to a combination of the difference in trigger and data zero levels on the oscilloscope and the shallow slope of the pulse as it crossed the trigger level.

3.7 ADDITIONAL COMMENTS

Although the greater part of the Project 8A.1 data have been presented in the previous sections, there does however remain a significant amount of data to be presented at a later date. This is necessitated by the great volume and

complexity of the data obtained and by the imposition of an early submission date for the POR.

3.7.1 PbS Radiometer (Section 2.2.7), Cameras (Section 2.2.11), and Photometer (Section 2.2.12). The bulk of the data from these instruments have not been presented. All of the photometer and radiometer data were recorded on an oscillographic roll. The data is presently being digitized and punched on IBM cards for further reduction and analysis in a high-speed digital computer. The densitometry of the film, although automatic, is still rather slow on an absolute scale.

A discussion of the results which should be forthcoming from these instruments is presented below.

The photometers gave the space-integrated flux received in five narrow and five wide wavelength bands. From these recordings the total power emitted by the various glows near the burst in the wavelength region 0.3 - 1.11 microns can be determined with small corrections for the finite field of view of the instrument. The cameras register more specifically the power emitted by the glowing regions per unit area per unit solid angle, that is, the brightness. From densitometry of the black and white film, the spatial brightness in the broad band 0.3 to 0.7

microns is found. The three-color layer film gives the brightness in each of the spectral bands shown in Figure 2.38. The photometer, which covers these wavelength bands and the important aurora-airglow lines, allows the fraction of this brightness in a continuum or at unexpected wavelengths, and the fraction in or near the lines, to be computed.

Straightforward photogrammetry of the photographs taken from the four stations permits construction of a three-dimensional picture of the glowing volumes, so that the optical/infrared blackout from an arbitrary position can be computed. Furthermore, the three-dimensional information permits the power emitted per unit volume to be calculated and, thus, the reaction rates estimated.

The sky brightness map may be extrapolated into the infrared by intercomparing the fluxes received by the infrared instruments with those received in the visible. The complete mapping procedure can be illustrated by taking an example, such as Blue Gill Triple Prime.

The color photographs (Figures 3.354 through 3.357) show a white fireball with a turbulent surface. Micro-densitometric analysis of the films establishes the average surface brightness of this region, as well as the

fluctuations in brightness (actually, a quantitative measurement of the granularity, which is useful to system planners, can be derived). The photometric data show that the total flux from the fireball contained approximately equal energy in each wavelength interval. Lack of color in the photographs—which can be corroborated by microdensitometry of the color film—suggests that the same mechanism is responsible for the glow of the whole region. The fluxes measured by the infrared instruments—PbS radiometer at 1.58 microns, R4K1 tracking radiometer at 6 wavelengths, and others—bear a direct relationship to those measured by the photometers and films, and have the same rate of decay. This fact, and the information from the modest degree of scanning of the fireball that the instruments gather during aircraft rolls, suggests that the infrared is coming from the white regions. The infrared surface brightnesses are related to the visible brightnesses, but they are not necessarily proportional, because the opacity of the fireball at these longer wavelengths is not known. The infrared map is certainly not as accurate as the visible map—for example, there is no justification in extrapolating the visible granularity to the infrared, because the opacity is unknown. Furthermore, there could be

some mechanism giving infrared emission from the visibly dark areas inside the fireball—but the overall, rough outline is most probably correct.

As a further point, the emission per unit volume, coupled with the ambient density, permits the reaction rate in the cloud to be computed. This information, along with the spectrum and its history, possible limb darkening effects, and the hydrodynamics of the glow, may be used to isolate the excitation mechanism or mechanisms.

3.7.2 Interferometer (Section 2.2.15). Data were obtained with this instrument on every shot. The reduction of this data has been delayed due to a breakdown of the a-d conversion system. The reduced data will be presented in a supplementary report.

Preliminary results, obtained by tape loop analysis, indicated strong radiating bands in the vicinity of 1.04 and 2.7 microns during the first minute after detonation on Shot Star Fish Prime.

3.7.3 Dispersion Units (Section 2.2.5). The data presented for Shot Tight Rope have been reduced only in a preliminary fashion thus far. Voltages have been scaled from oscilloscope pictures of the time zero waveform and the appropriate calibration factors applied.

Definite structure is evident, in all spectral regions, on the leading edge of the first peak ($\sim 800 \mu \text{sec}$).

The data channels from this event will be reduced via the a-d conversion system, and the results will be presented at a later date.

3.7.4 IR Spectrometer (Section 2.2.10). This instrument obtained no spectral information, mainly because the sensitivity of the system was not sufficient to cope with the low signal intensity in the regions at the times it was scanning.

3.7.5 Calorimeter (Section 2.2.13). No calorimeter data were obtained from any station on any shot, although a consideration of the apparent system sensitivity and incident energy indicated that signals should have been received. The reason is unknown.

3.7.6 Elevation Angle and Relative Bearing of Moon. This information for Shots Star Fish Prime and Tight Rope is contained in Appendix I.

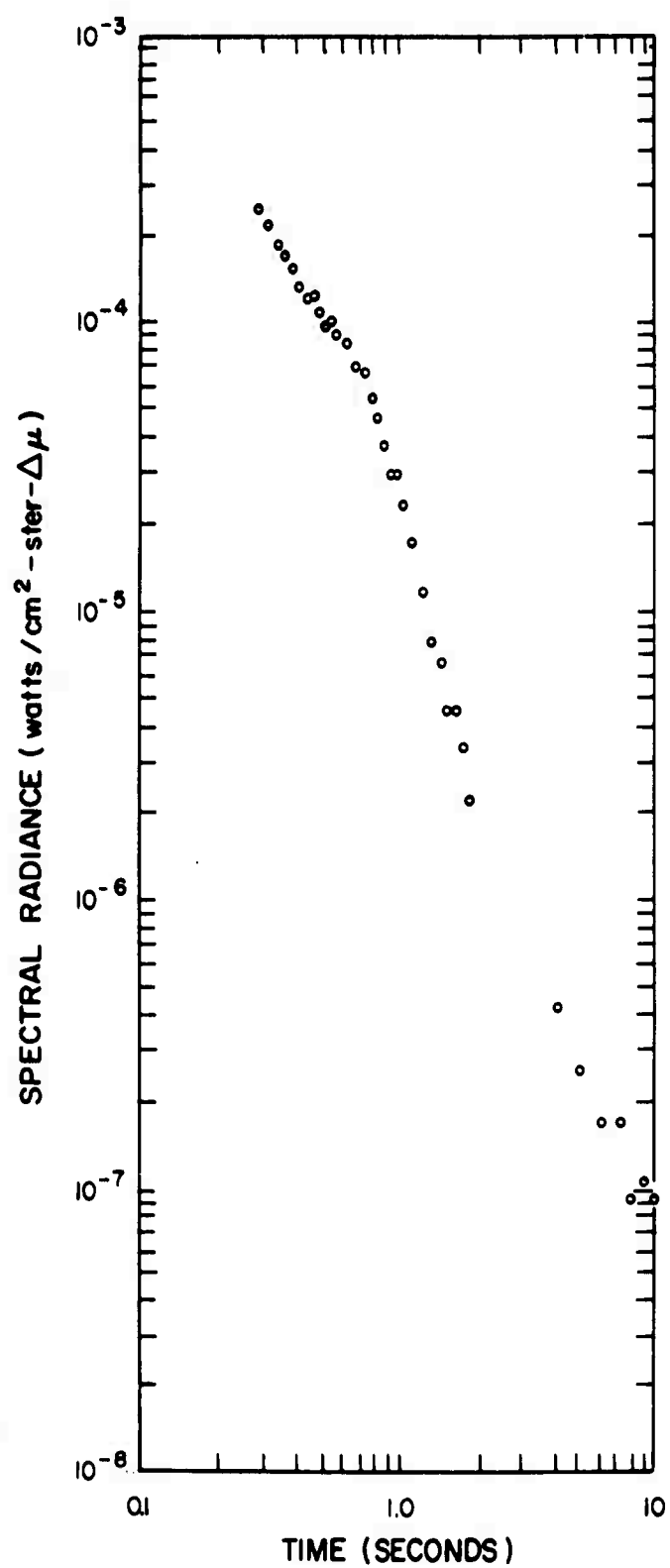


Figure 3.360 Spectral radiance, Kettle I, King Fish, Channel 1, early time.

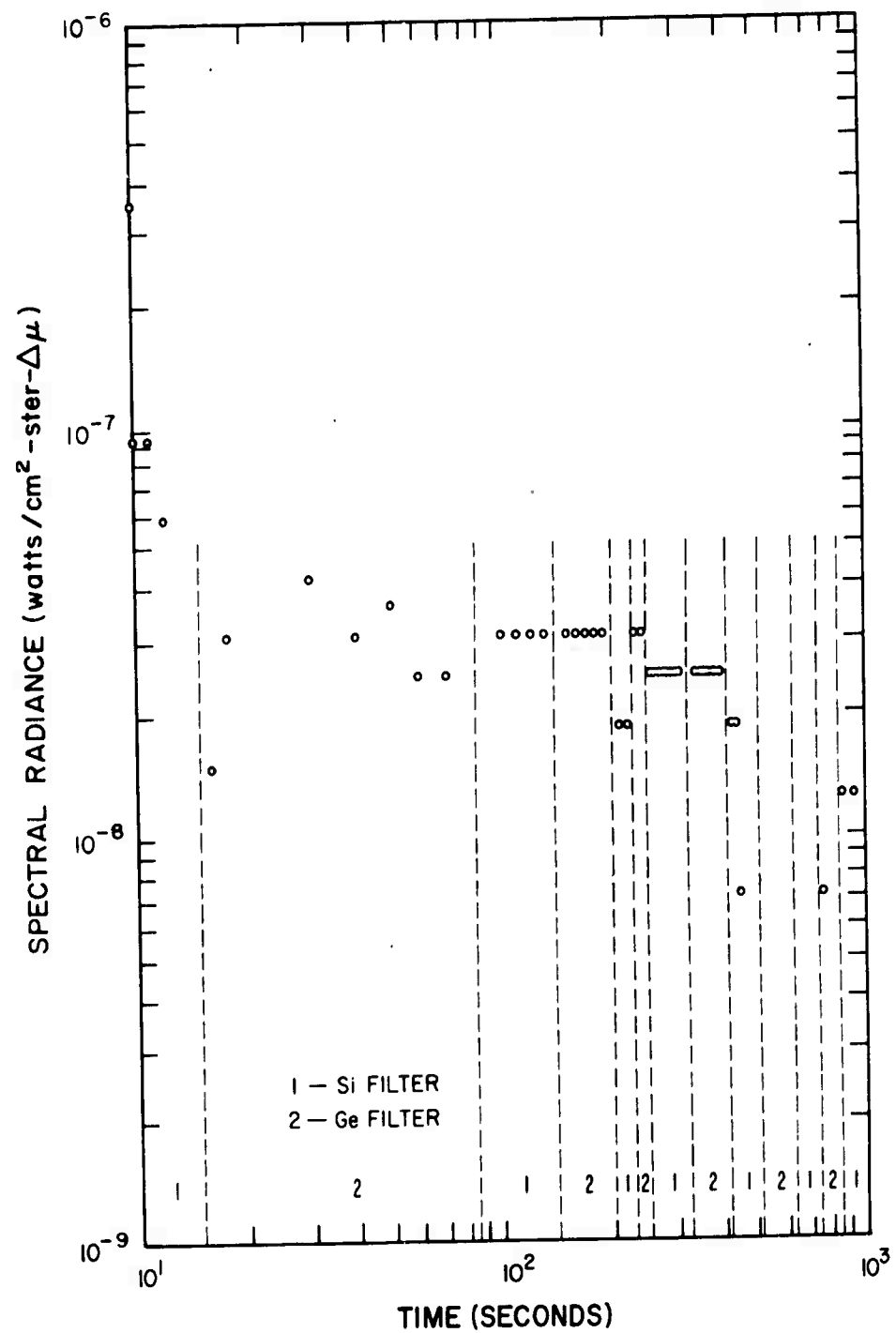


Figure 3.361 Spectral radiance, Kettle I, King Fish, Channel 1, late time.

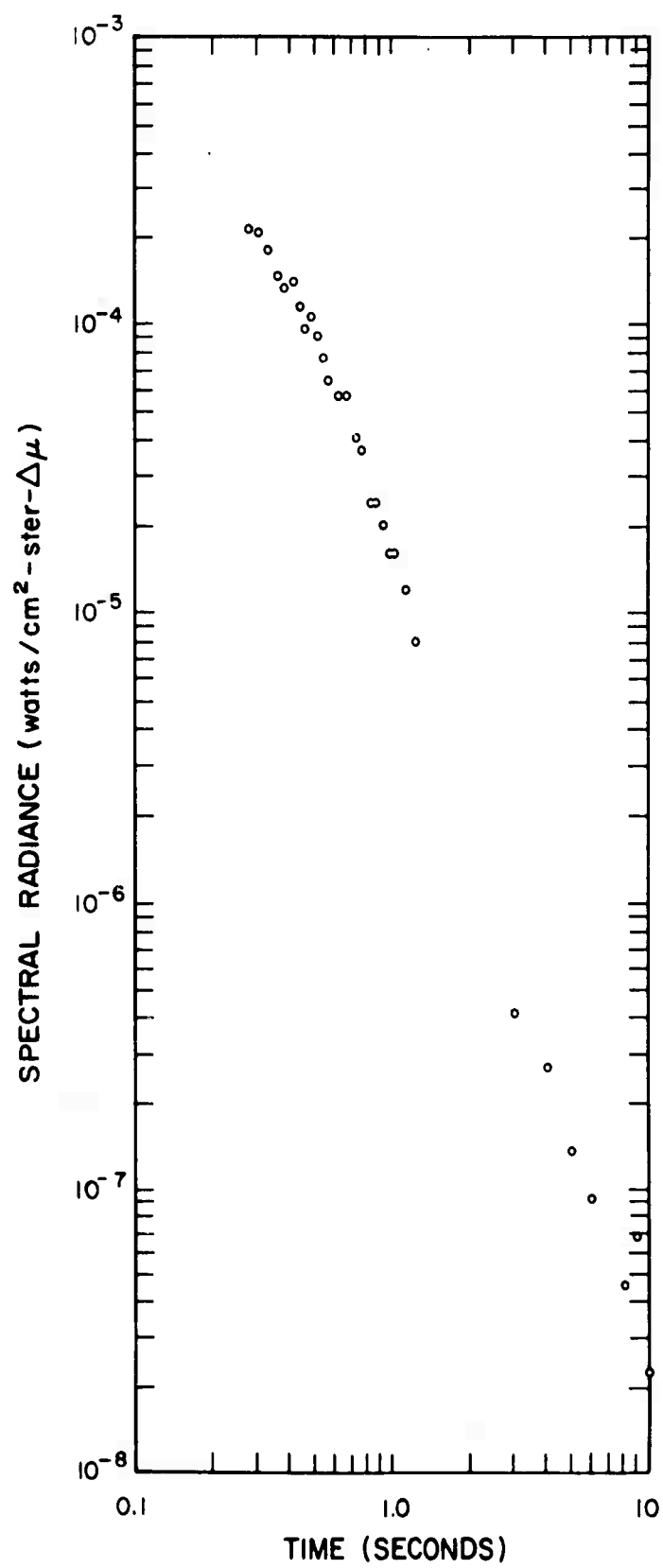


Figure 3.362 Spectral radiance, Kettle I, King Fish, Channel 2, early time.

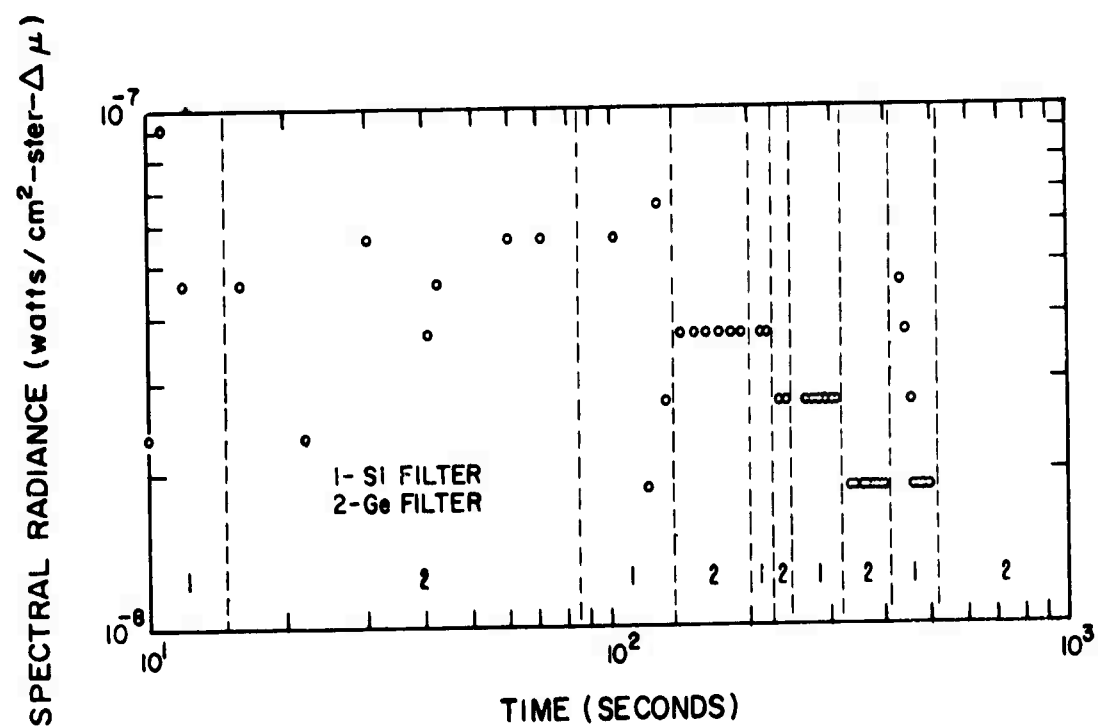


Figure 3.363 Spectral radiance, Kettle I, King Fish,
Channel 2, late time.

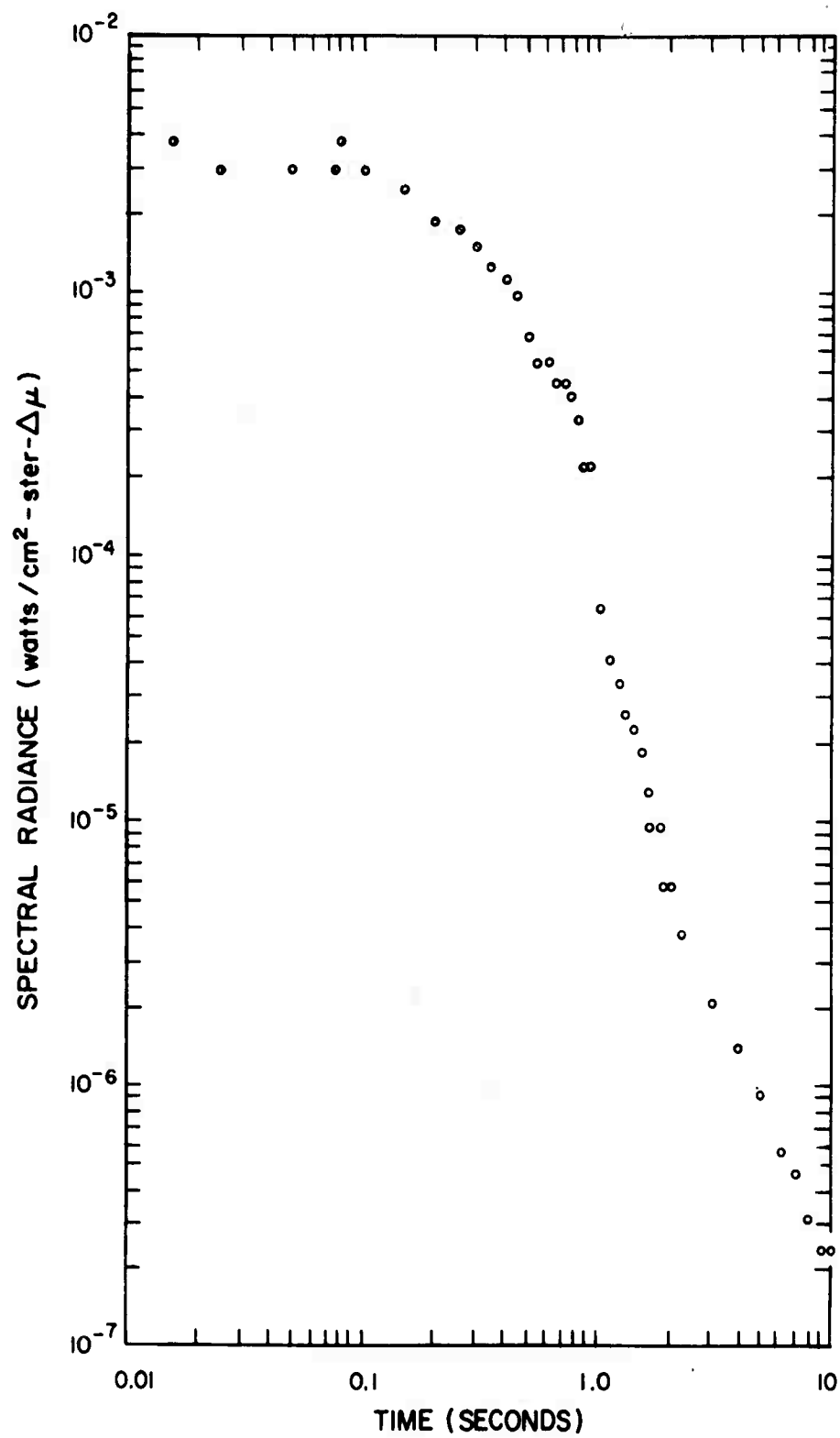


Figure 3.364 Spectral radiance, Kettle I, King Fish, Channel 3, early time.

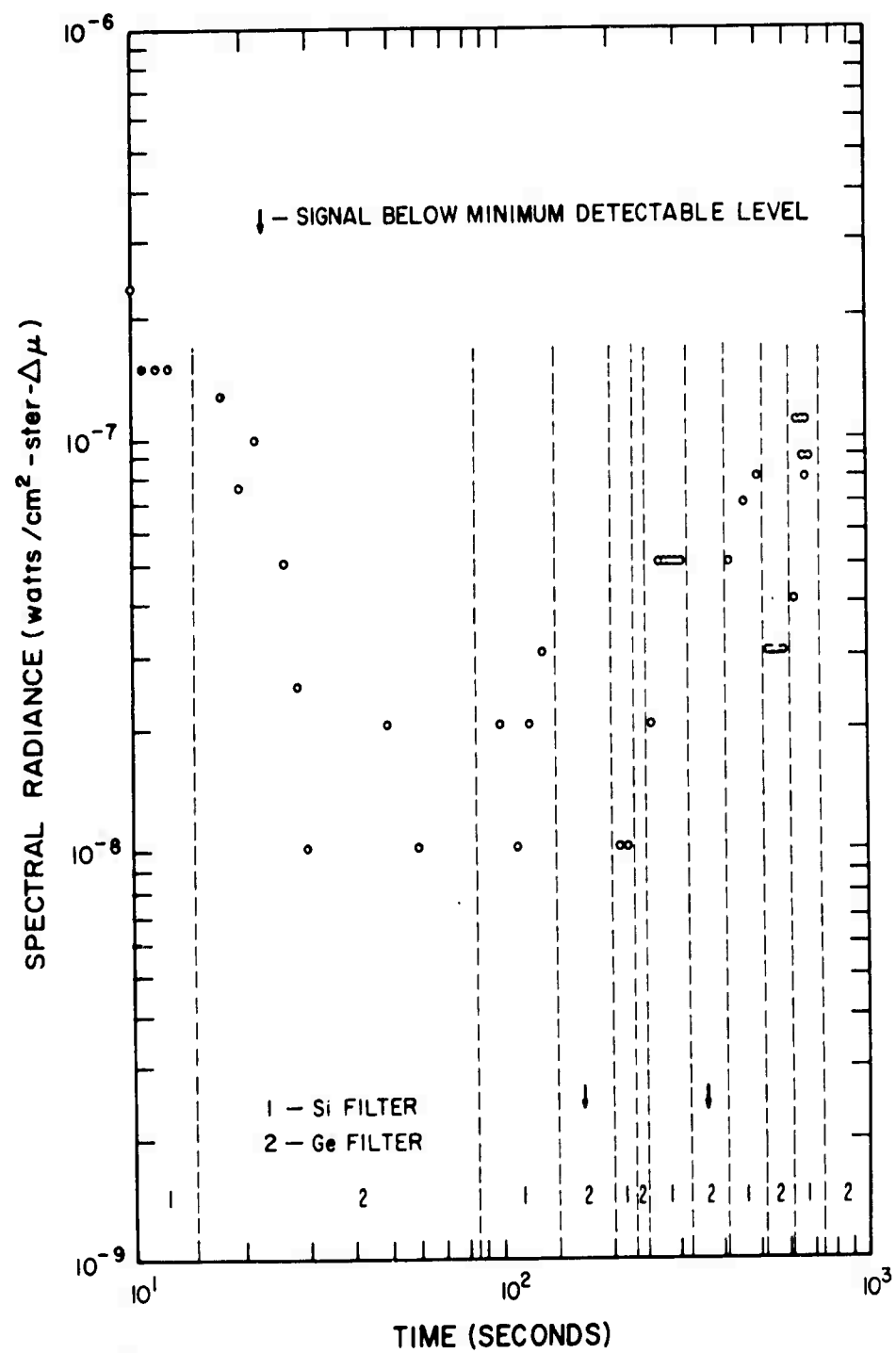


Figure 3.365 Spectral radiance, Kettle I, King Fish, Channel 3, late time.

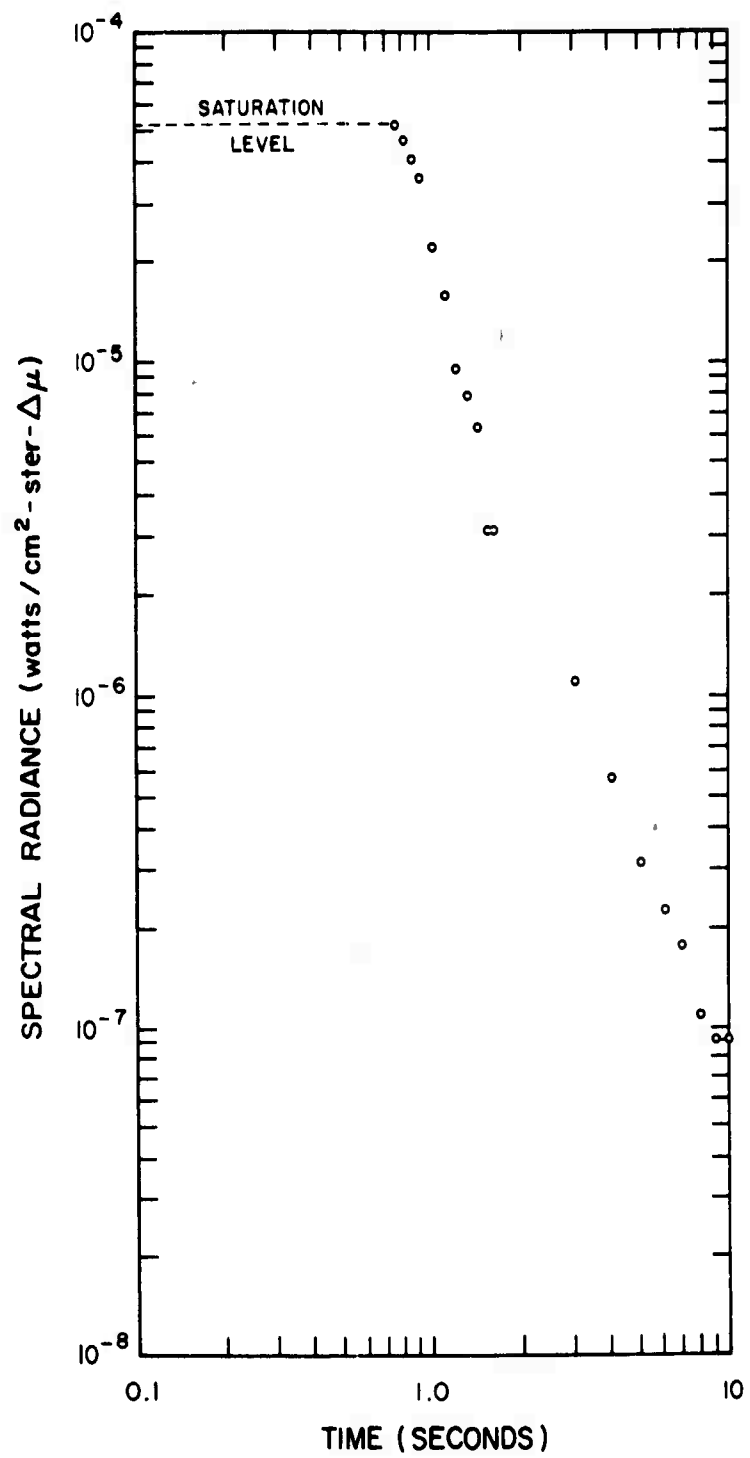


Figure 3.366 Spectral radiance, Kettle I, King Fish, Channel 4, early time.

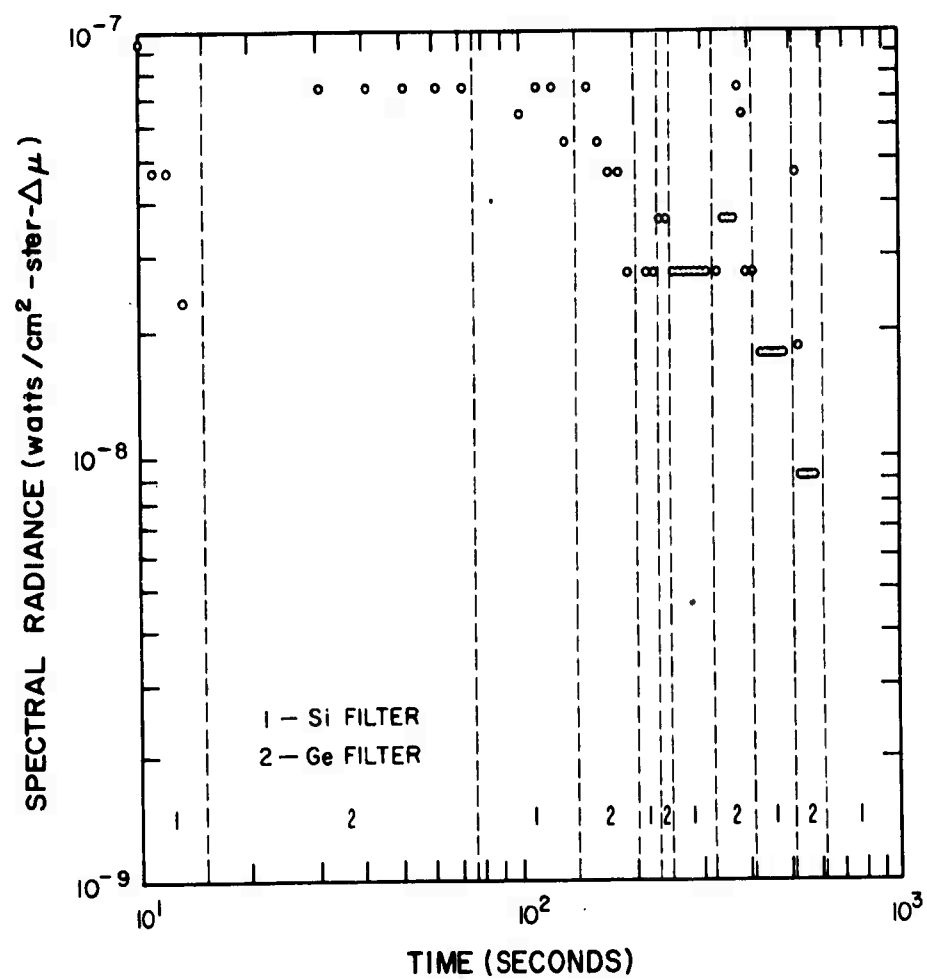


Figure 3.367 Spectral radiance, Kettle I, King Fish, Channel 4, late time.

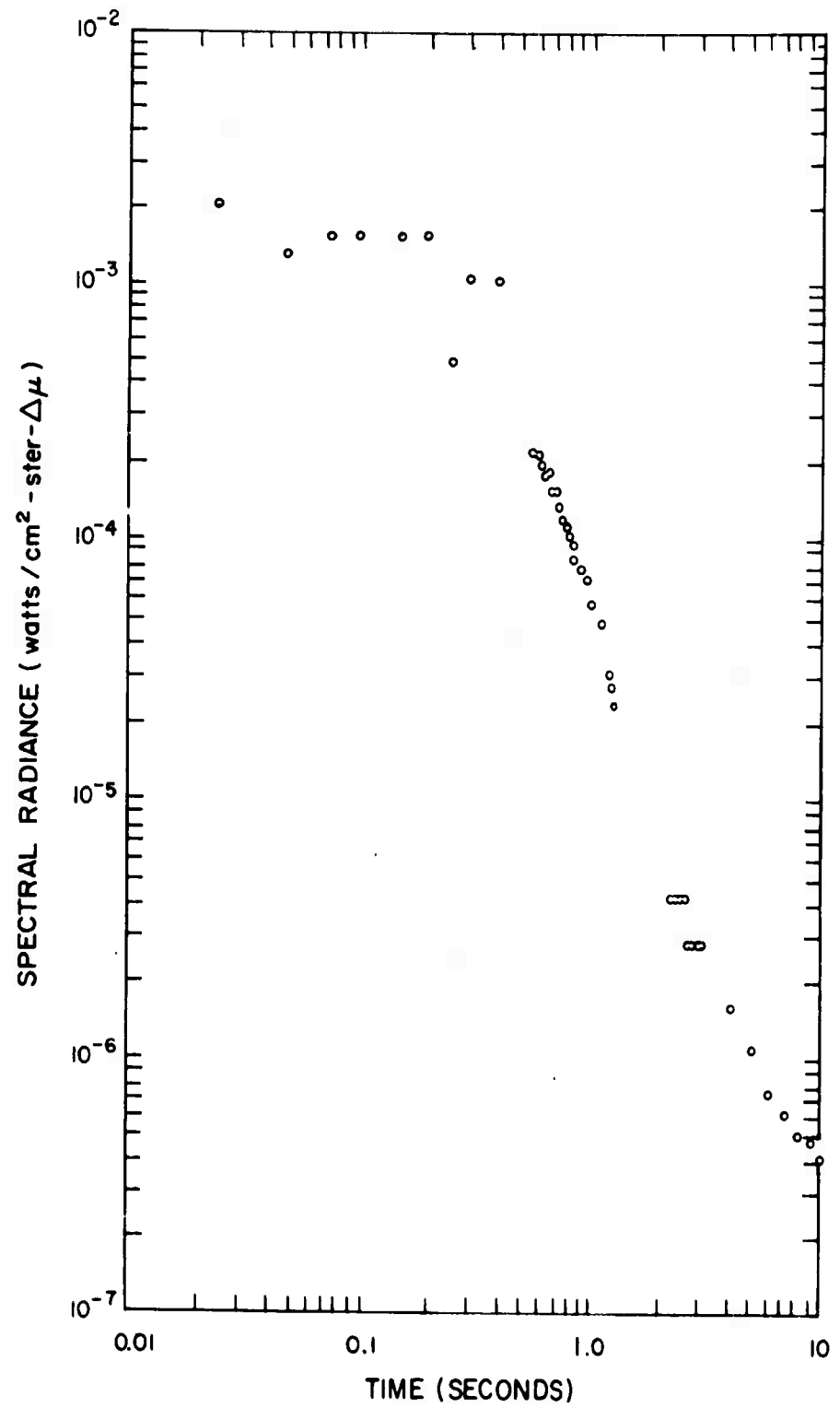


Figure 3.368 Spectral radiance, Kettle I, King Fish, Channel 5, early time.

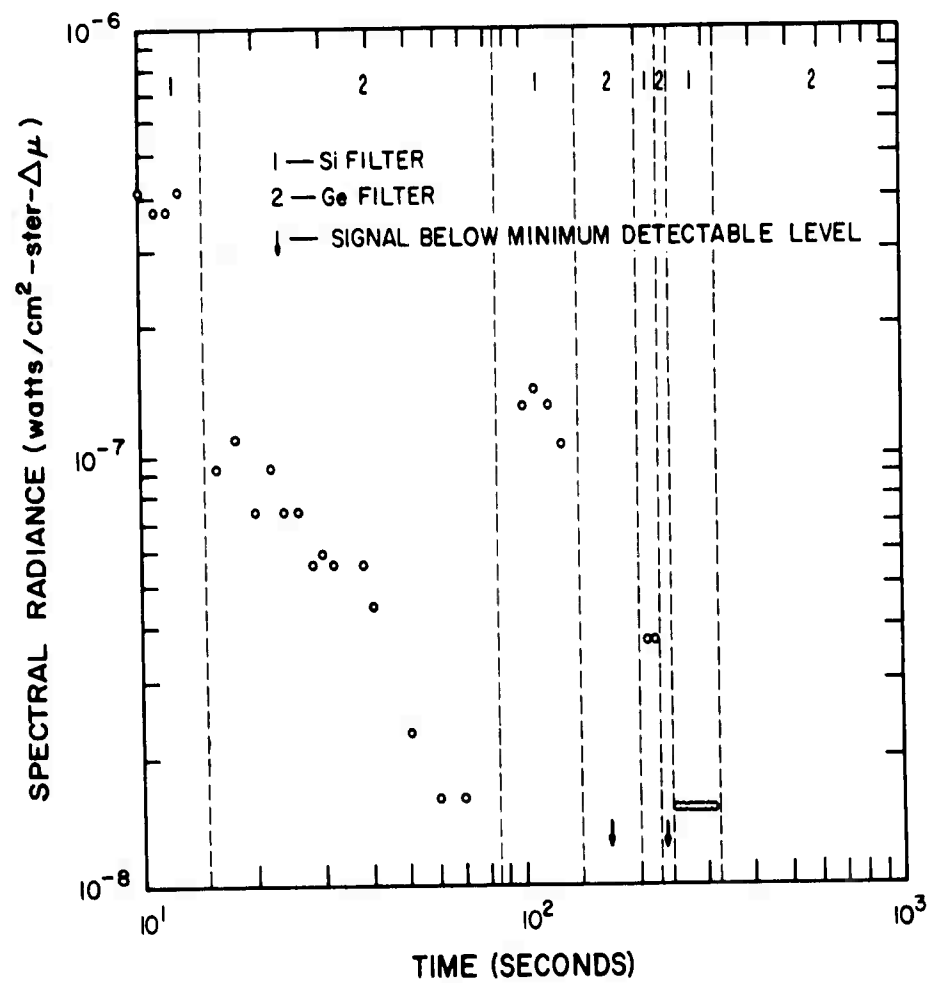


Figure 3.369 Spectral radiance, Kettle I, King Fish, Channel 5, late time.

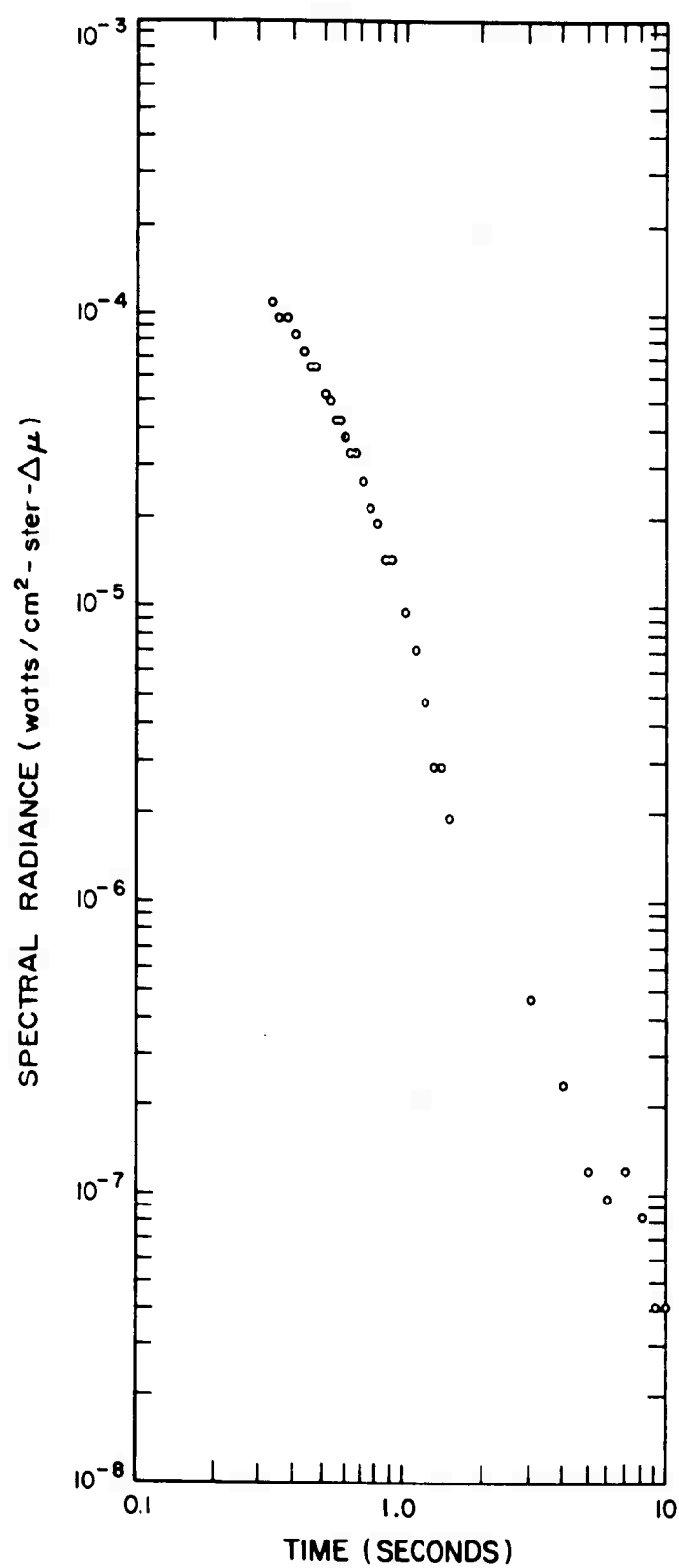


Figure 3.370 Spectral radiance, Kettle I, King Fish, Channel 6, early time.

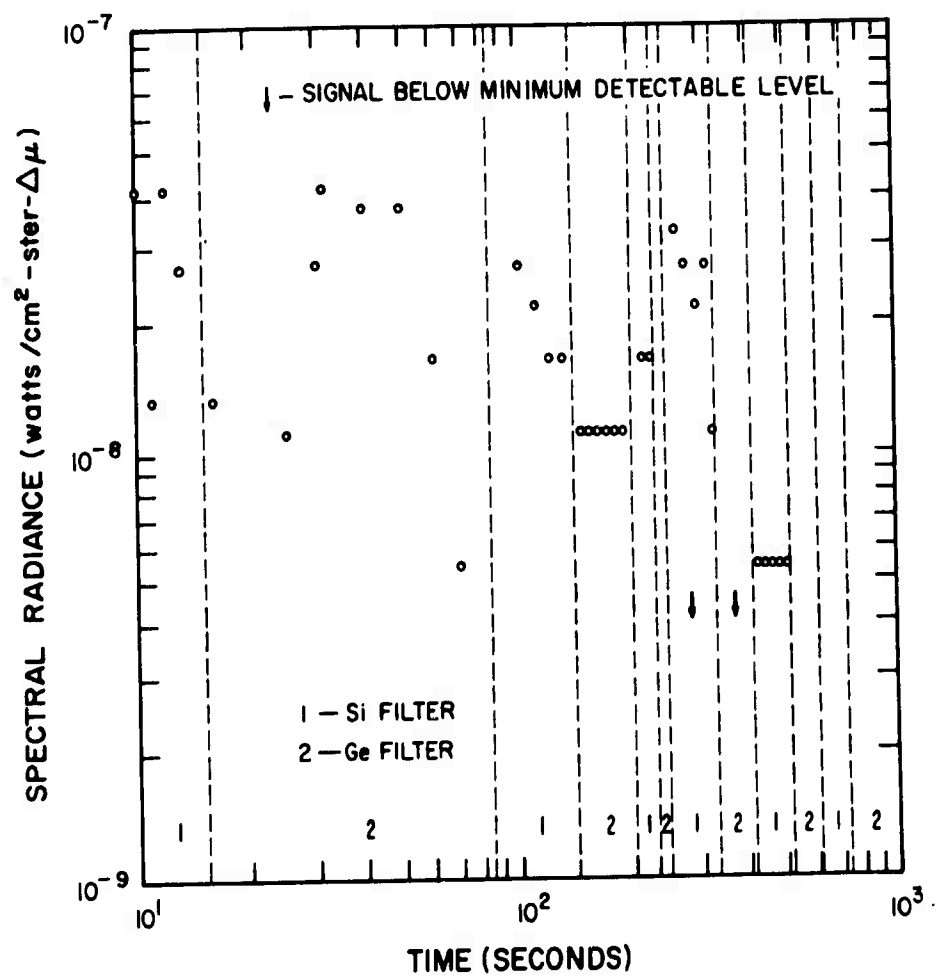


Figure 3.371 Spectral radiance, Kettle I, King Fish, Channel 6, late time.

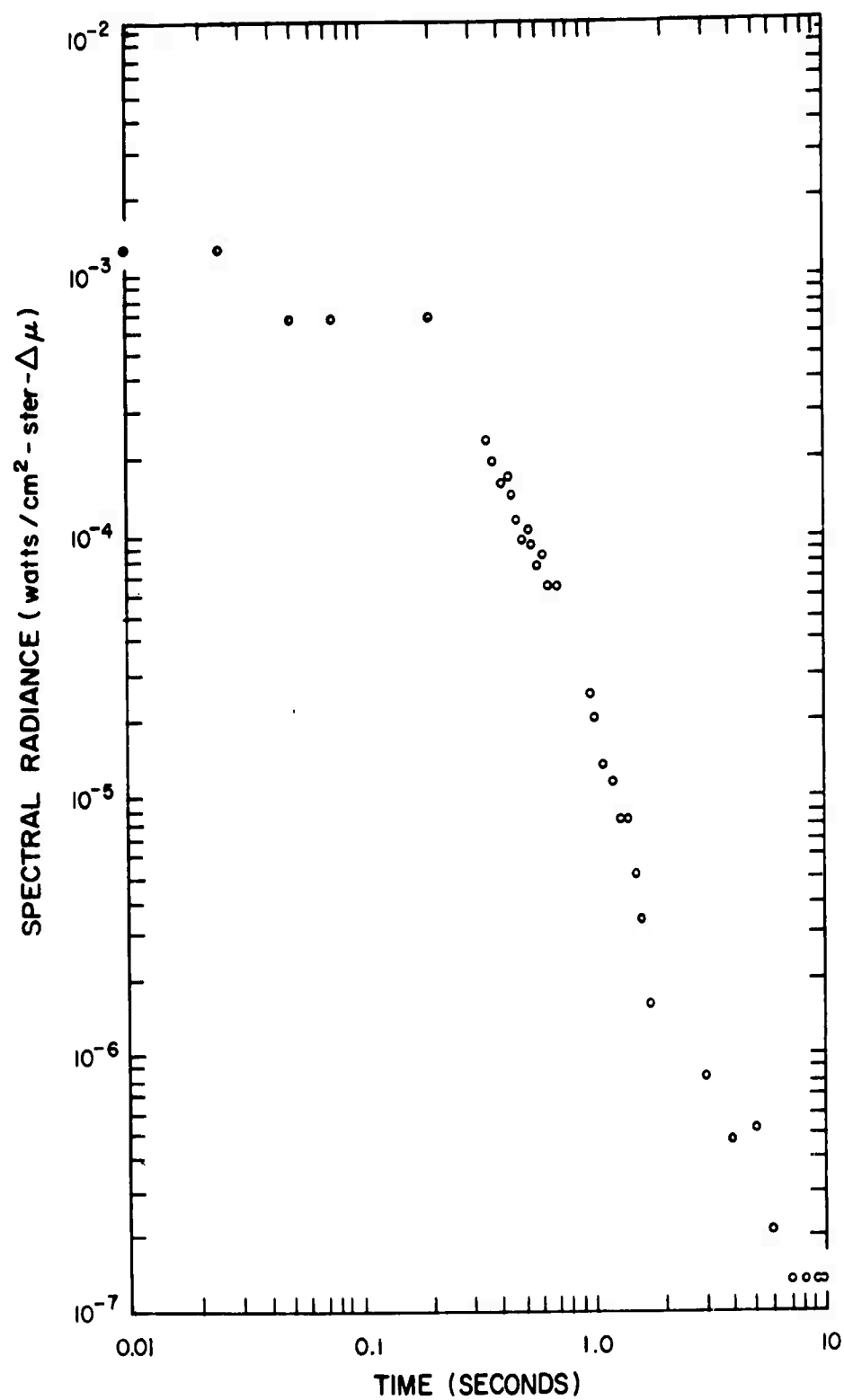


Figure 3.372 Spectral radiance, Kettle I, King Fish, Channel 7, early time.

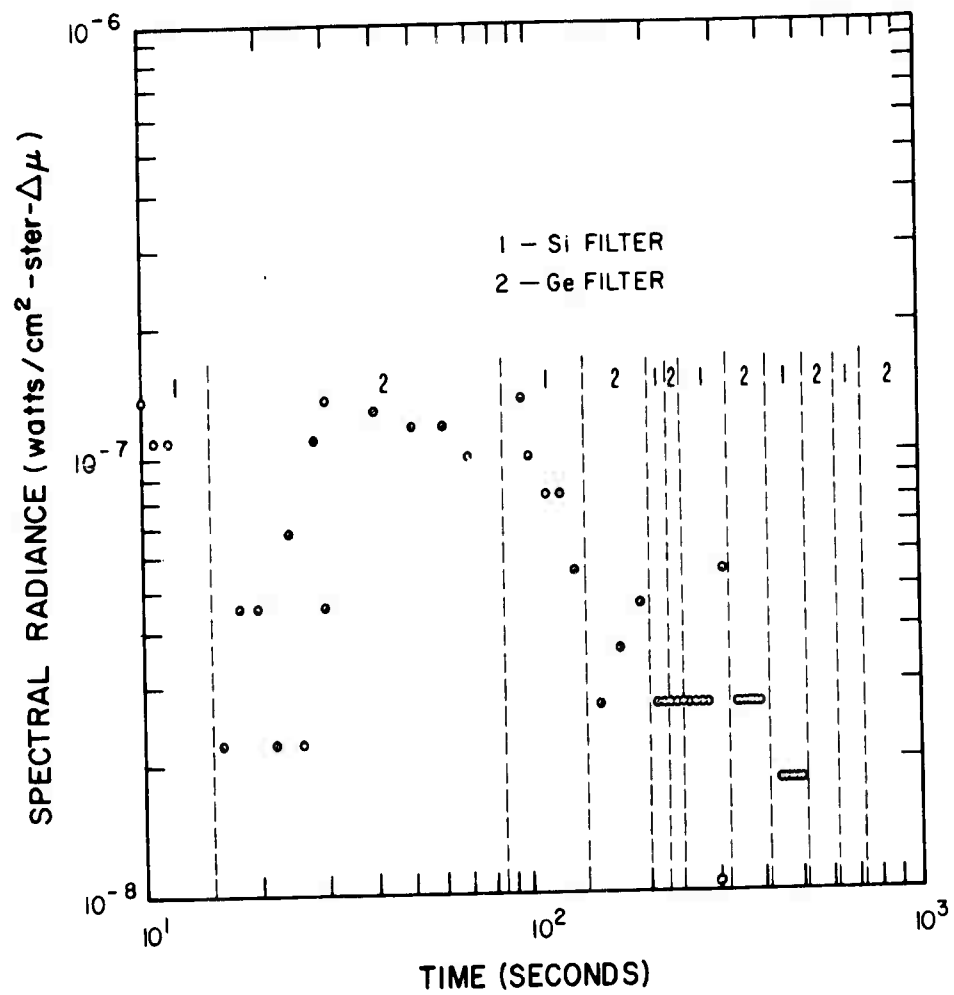


Figure 3.373 Spectral radiance, Kettle I, King Fish,
Channel 7, late time.

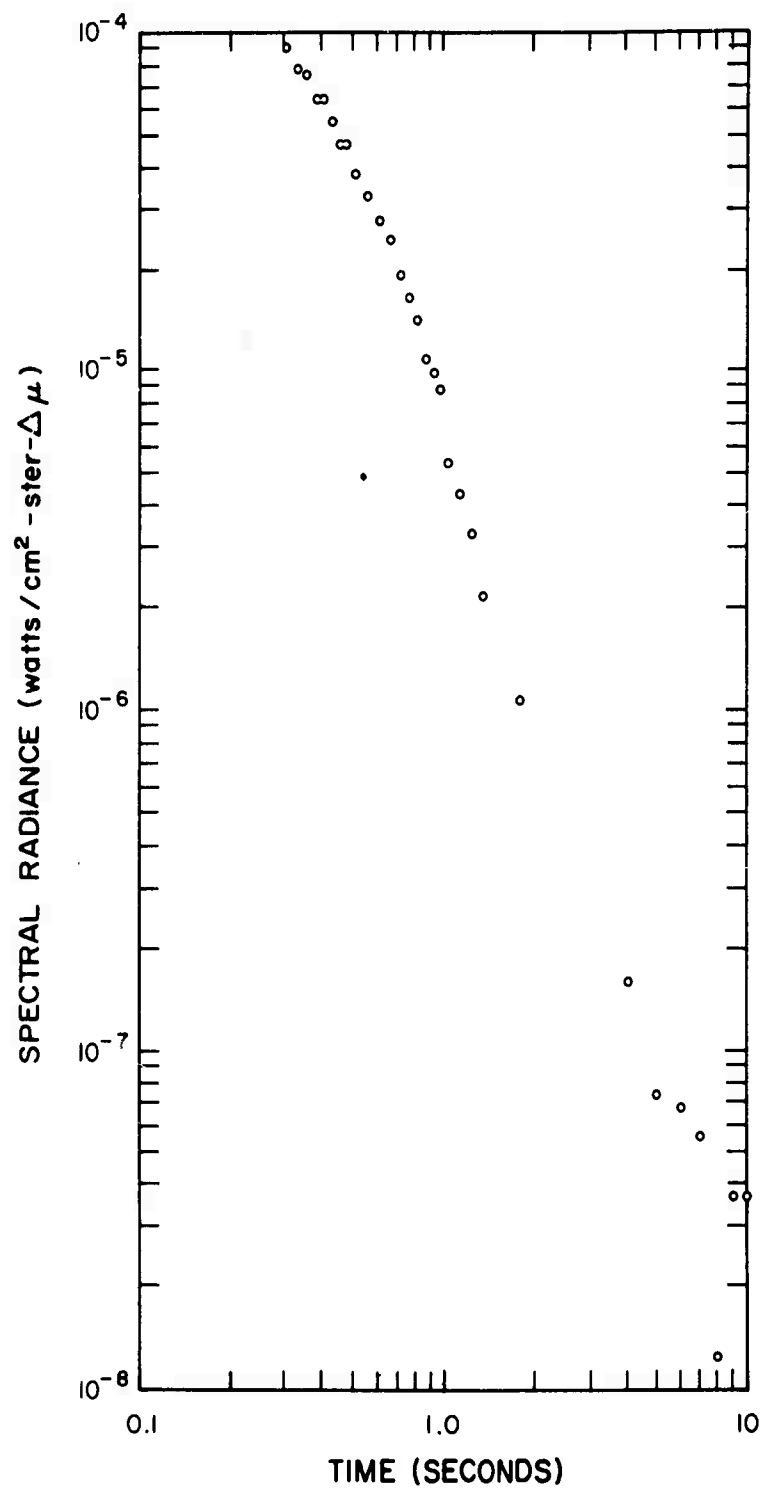


Figure 3.374 Spectral radiance, Kettle I, King Fish, Channel 8.

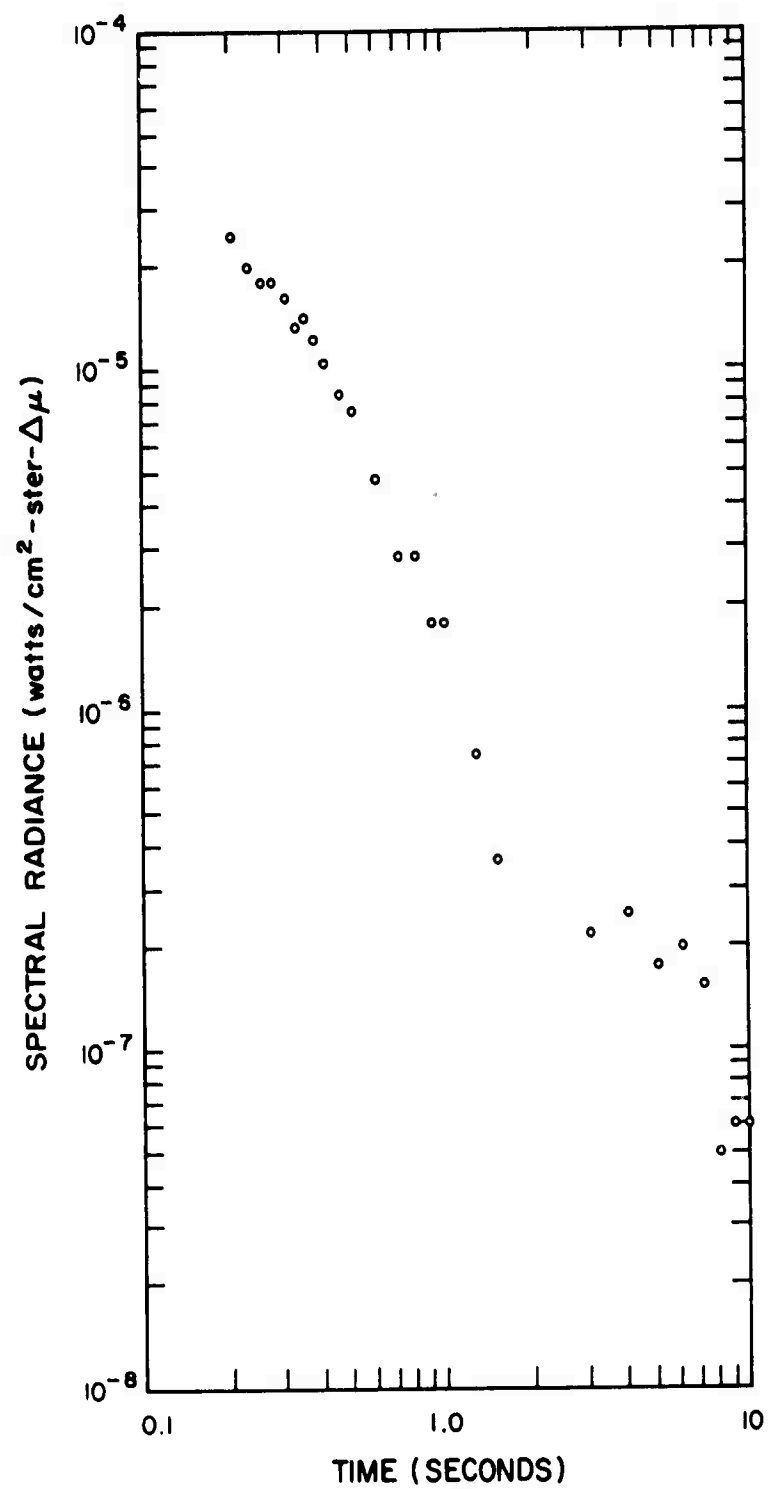


Figure 3.375 Spectral radiance, Kettle I, King Fish, Channel 9.

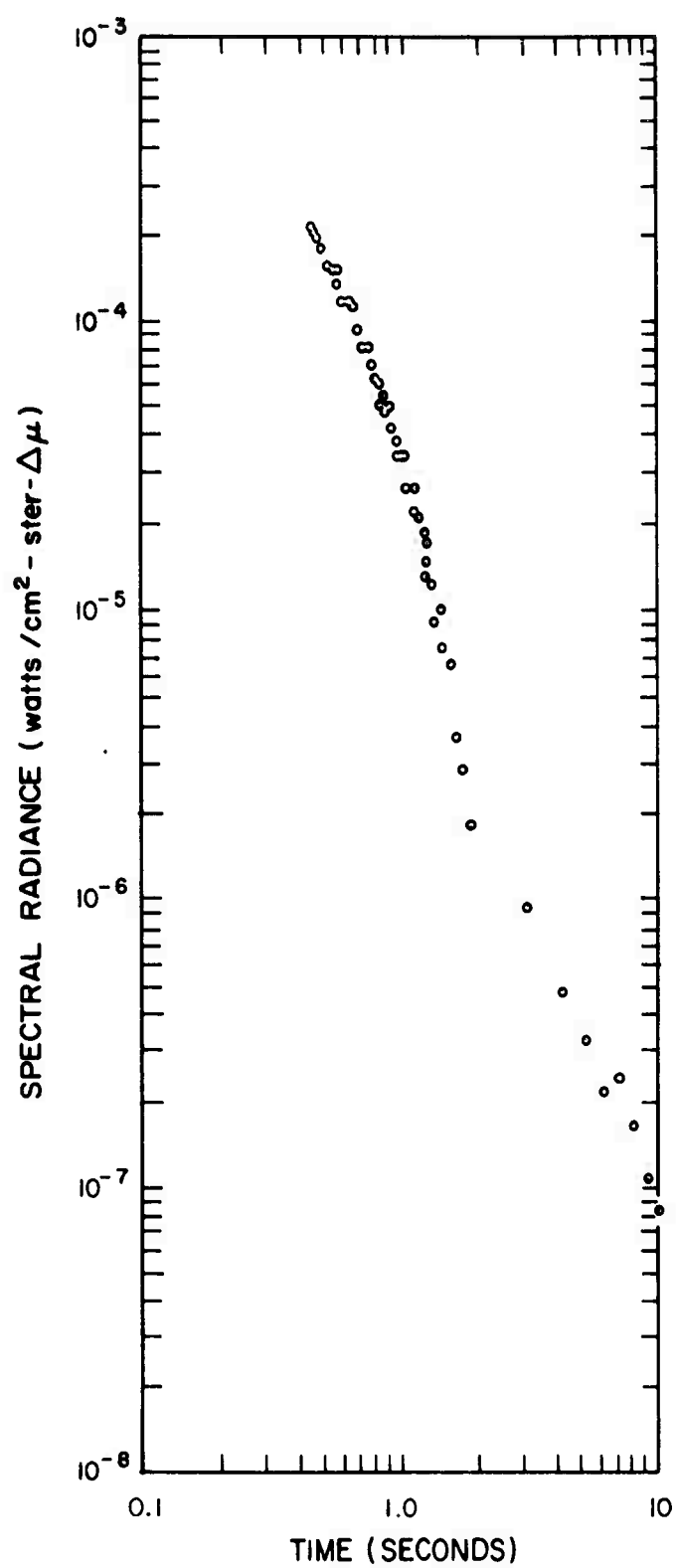


Figure 3.376 Spectral radiance, Kettle I, King Fish, Channel 14, early time.

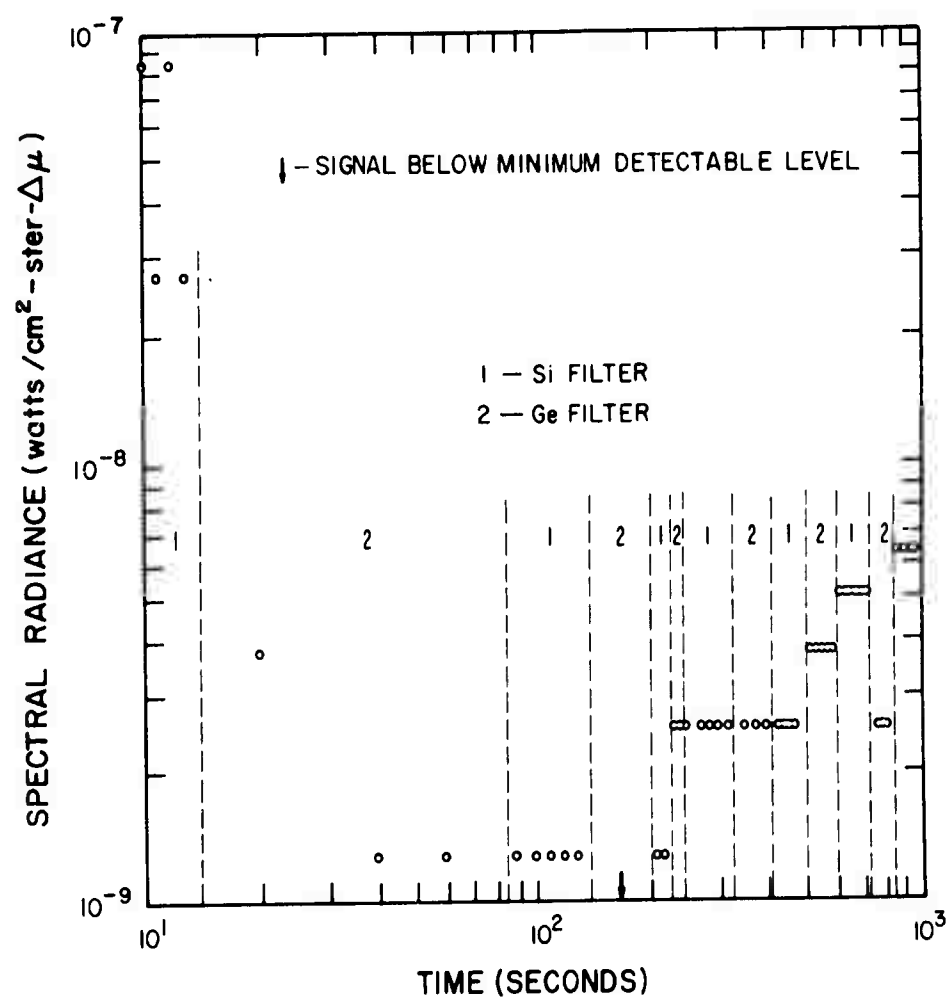


Figure 3.377 Spectral radiance, Kettle I, King Fish, Channel 14, late time.

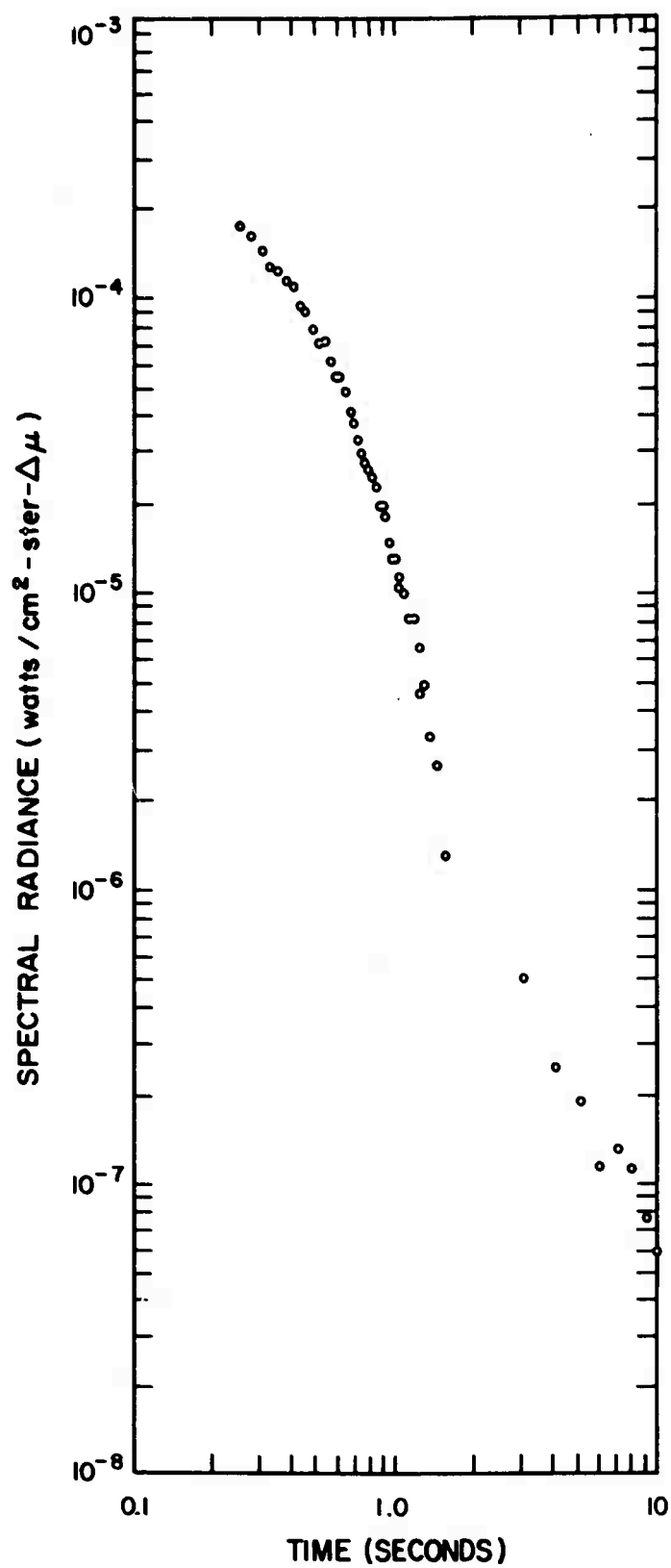


Figure 3.378 Spectral radiance, Kettle I, King Fish, Channel 15, early time.

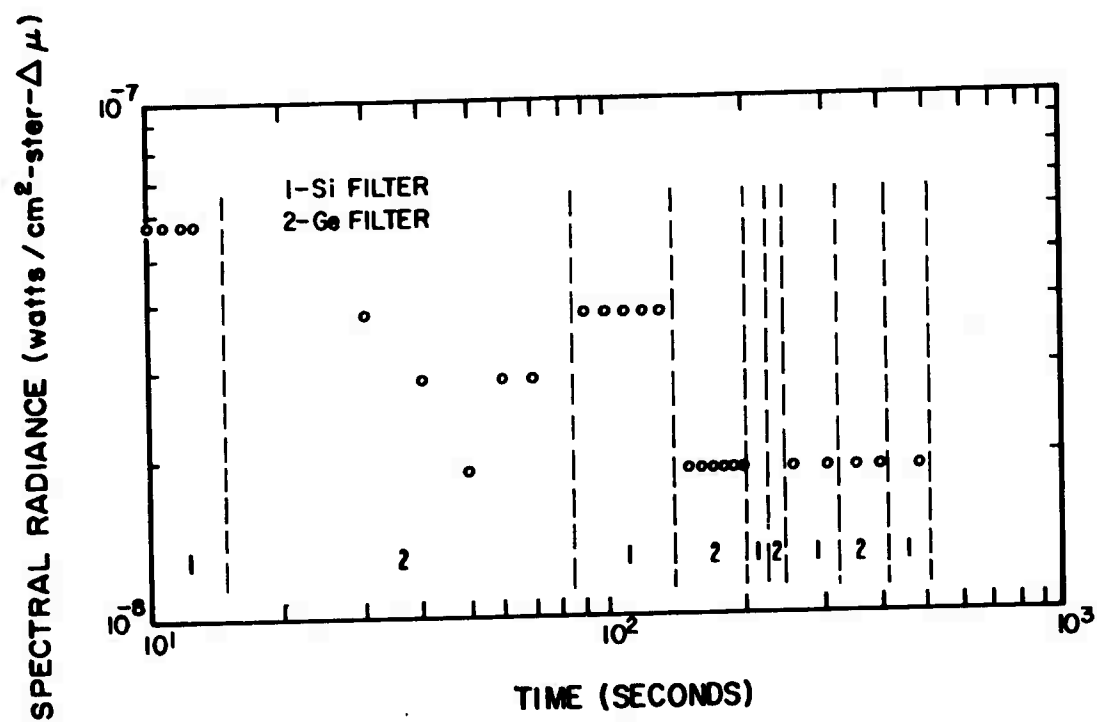


Figure 3.379 Spectral radiance, Kettle I, King Fish, Channel 15, late time.

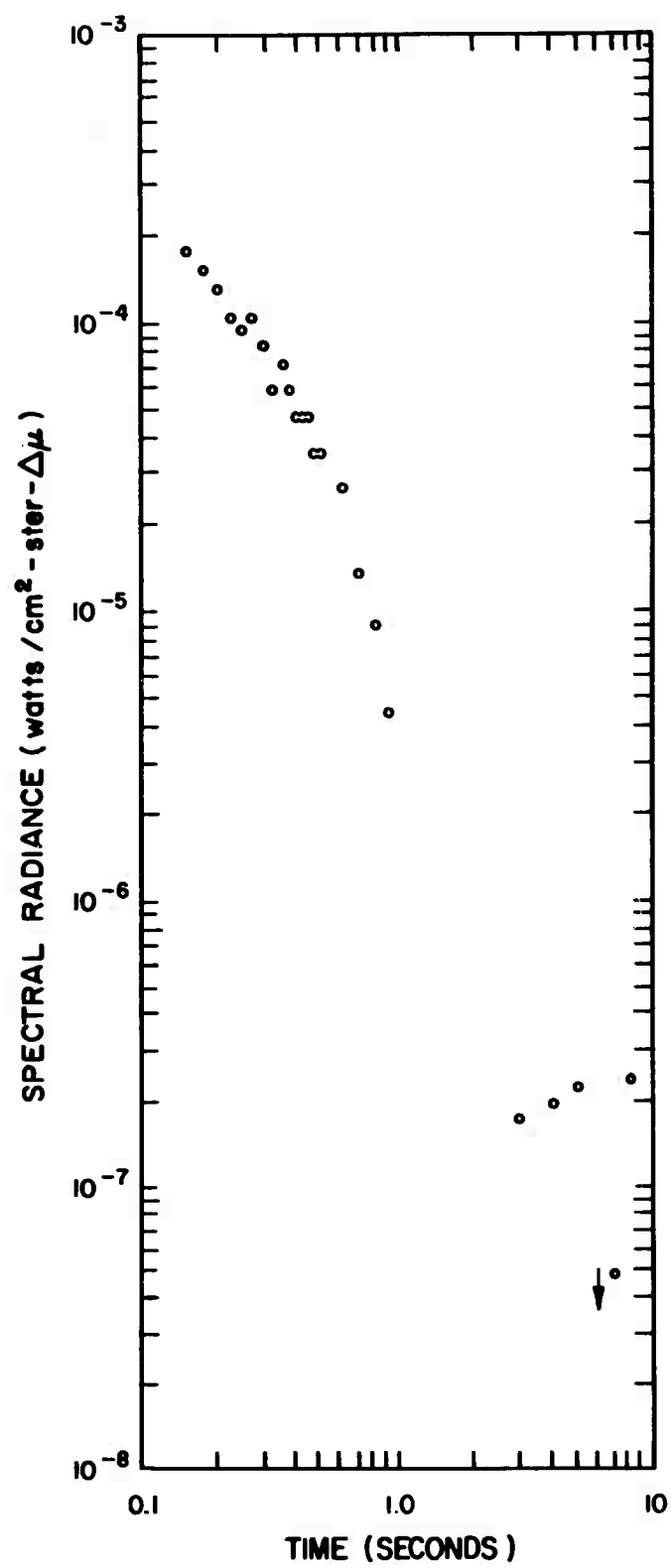


Figure 3.380 Spectral radiance, Kettle I, King Fish, Channel 16, early time.

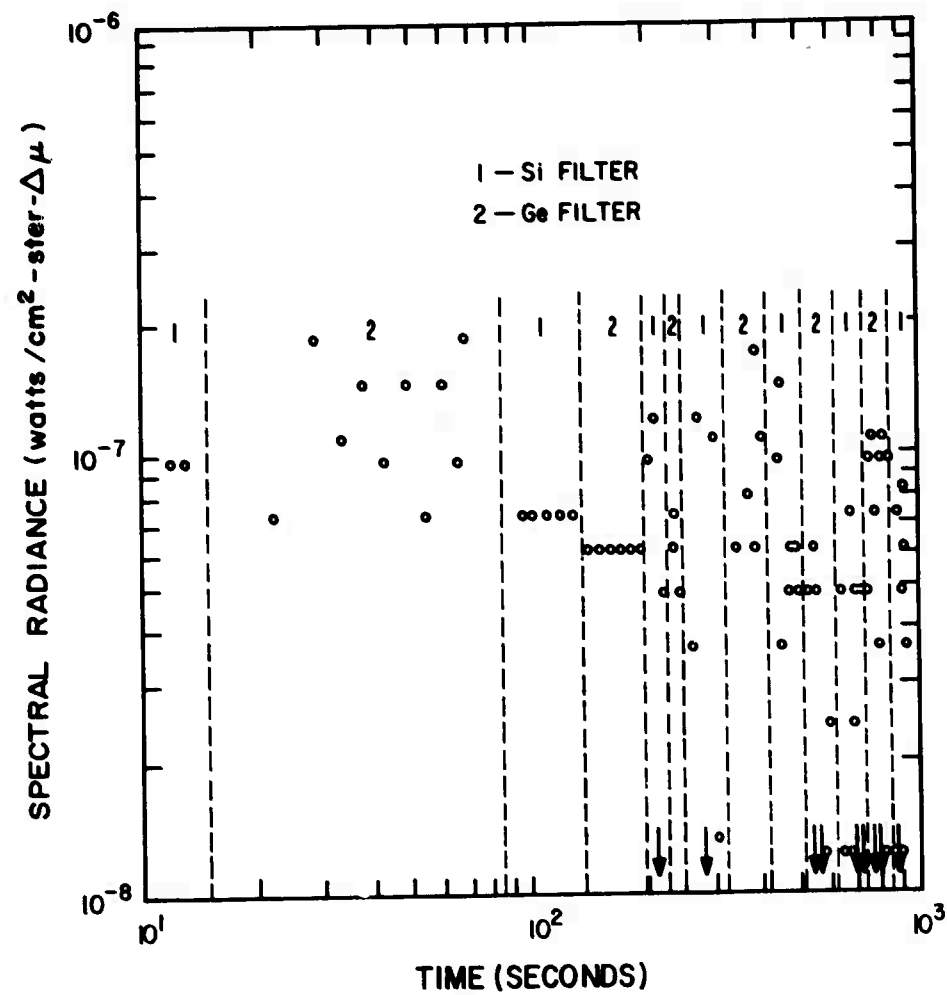


Figure 3.381 Spectral radiance, Kettle I, King Fish, Channel 16, late time.

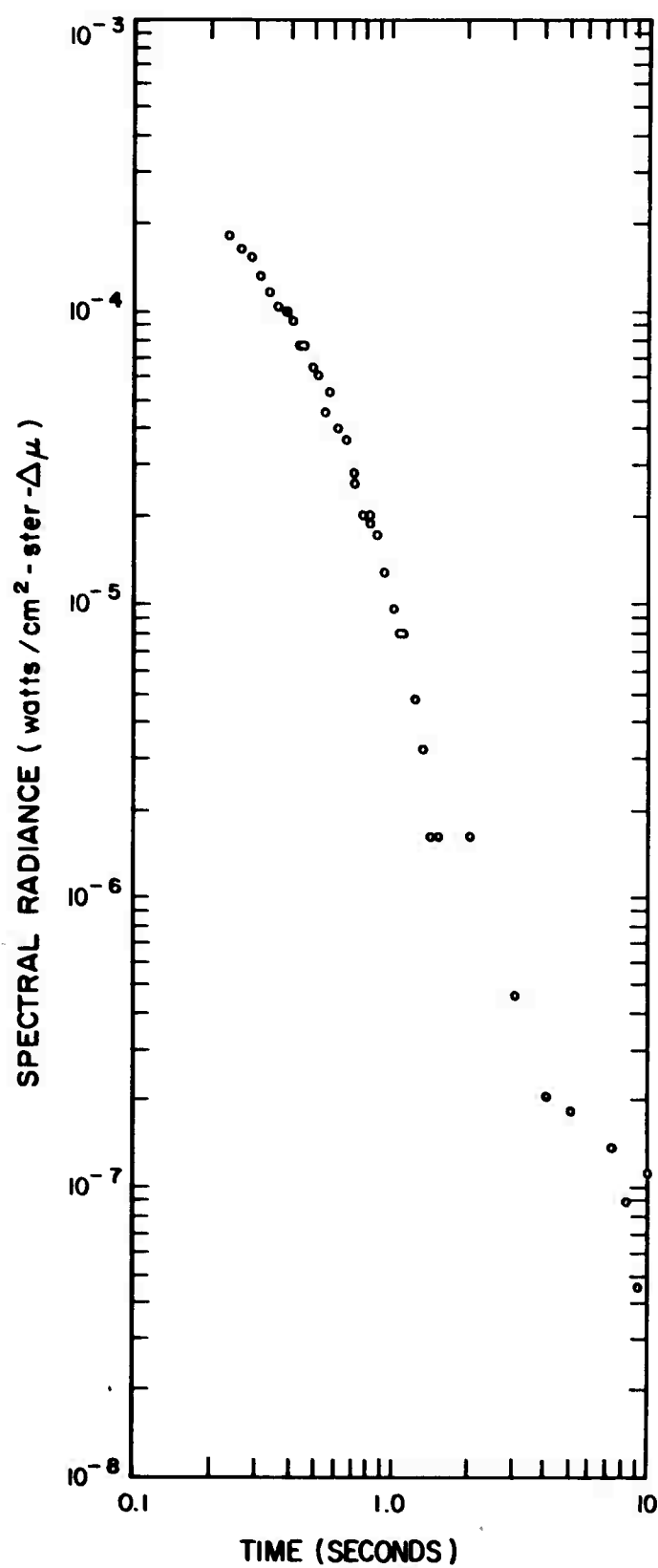


Figure 3.382 Spectral radiance, Kettle I, King Fish, Channel 17, early time.

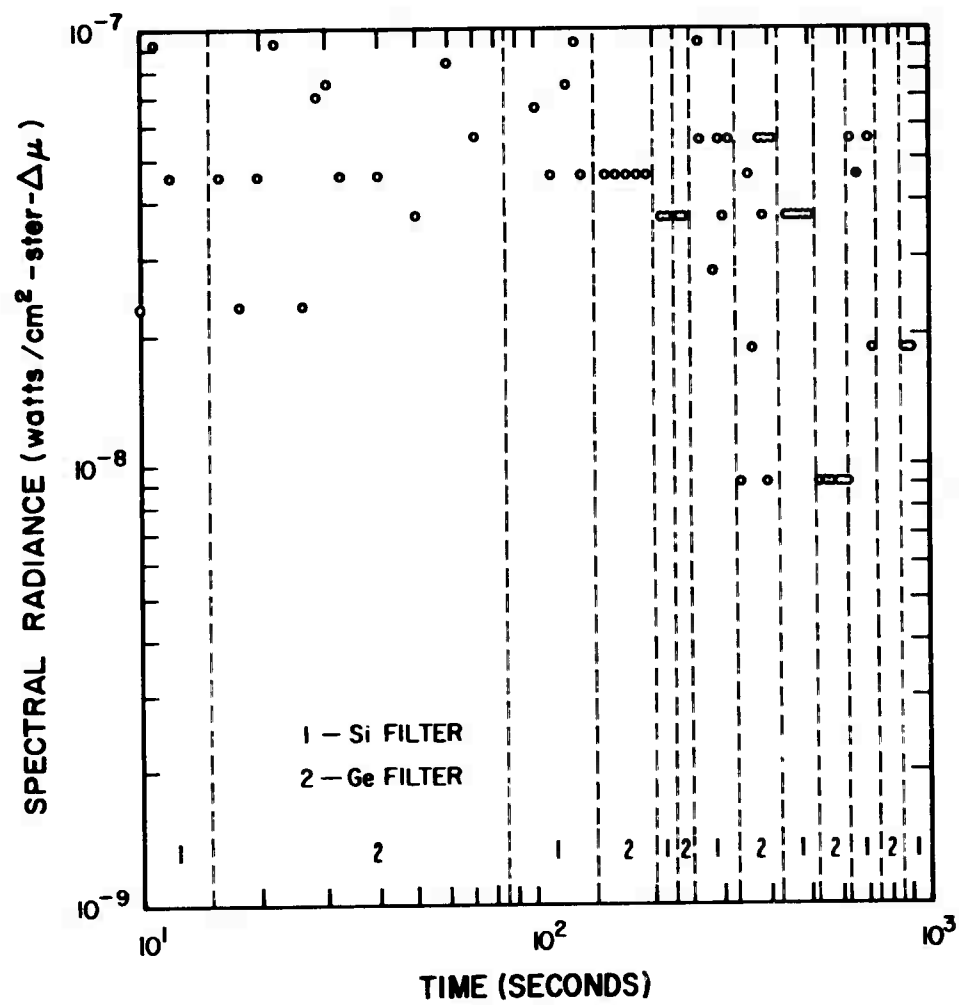


Figure 3.383 Spectral radiance, Kettle I, King Fish, Channel 17, late time.

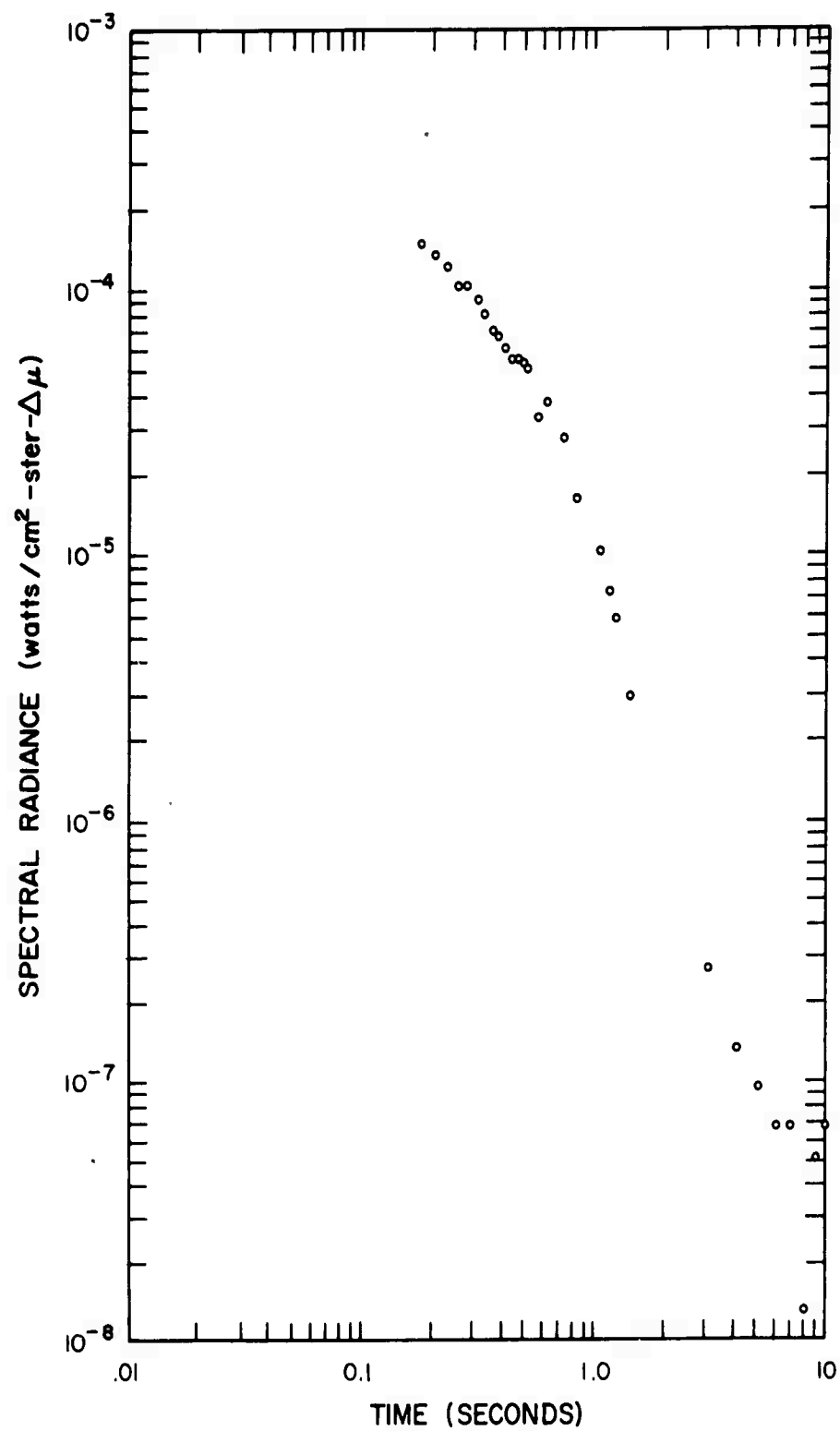


Figure 3.384 Spectral radiance, Kettle I, King Fish, Channel 18, early time.

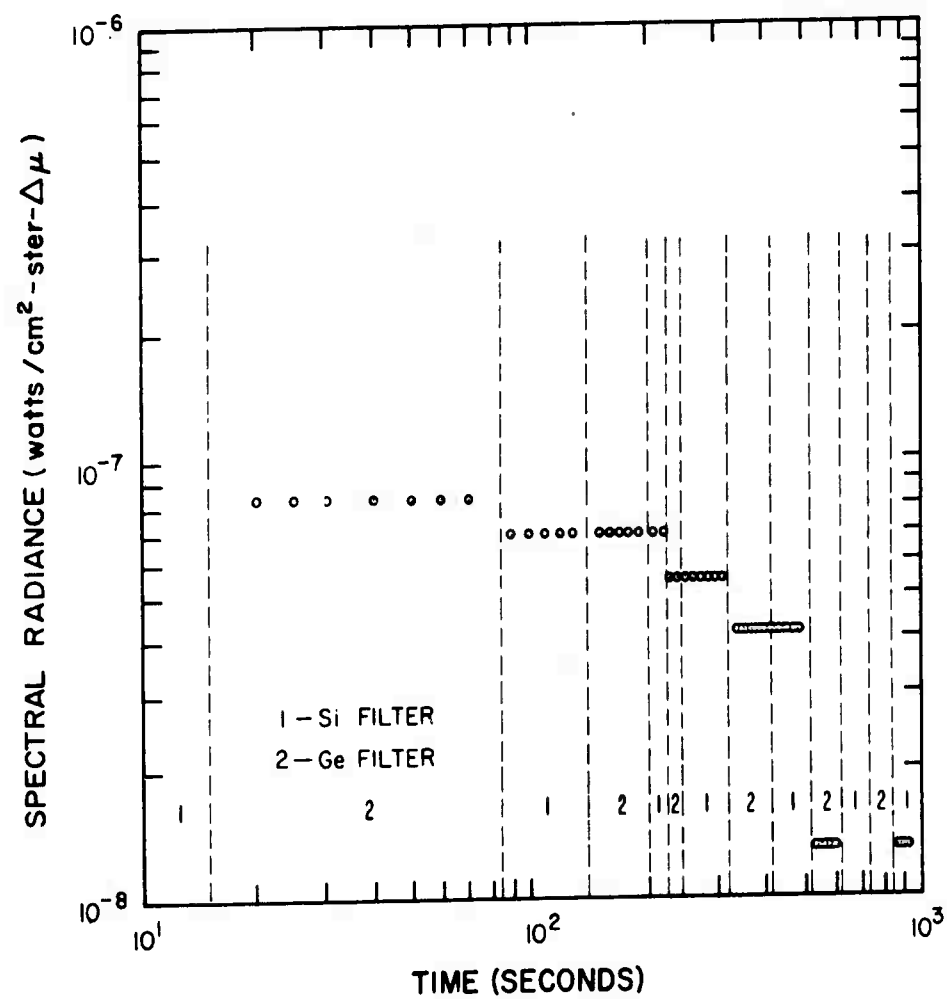


Figure 3.385 Spectral radiance, Kettle I, King Fish, Channel 18, late time.

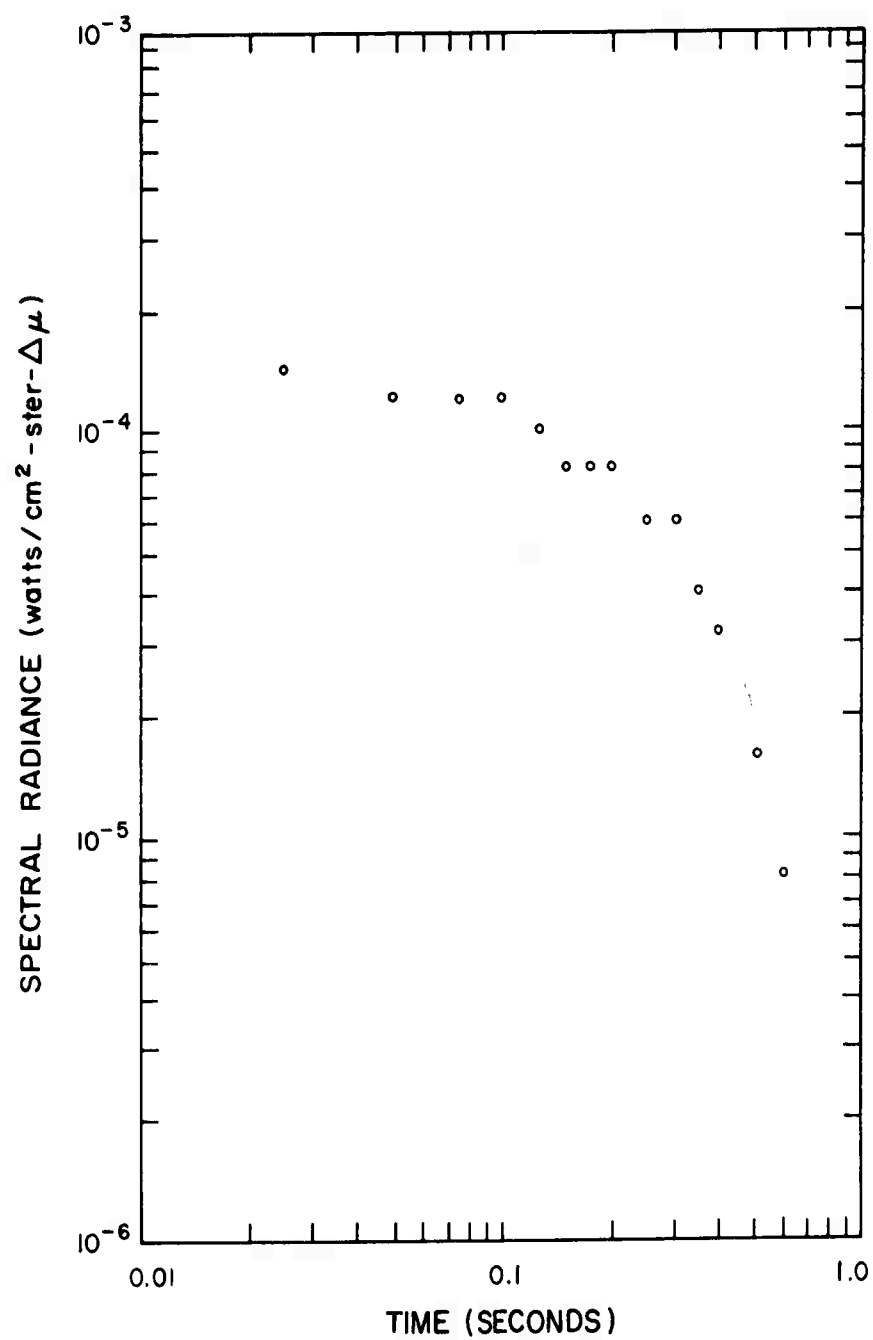


Figure 3.386 Spectral radiance, Kettle I, King Fish, Channel 19.

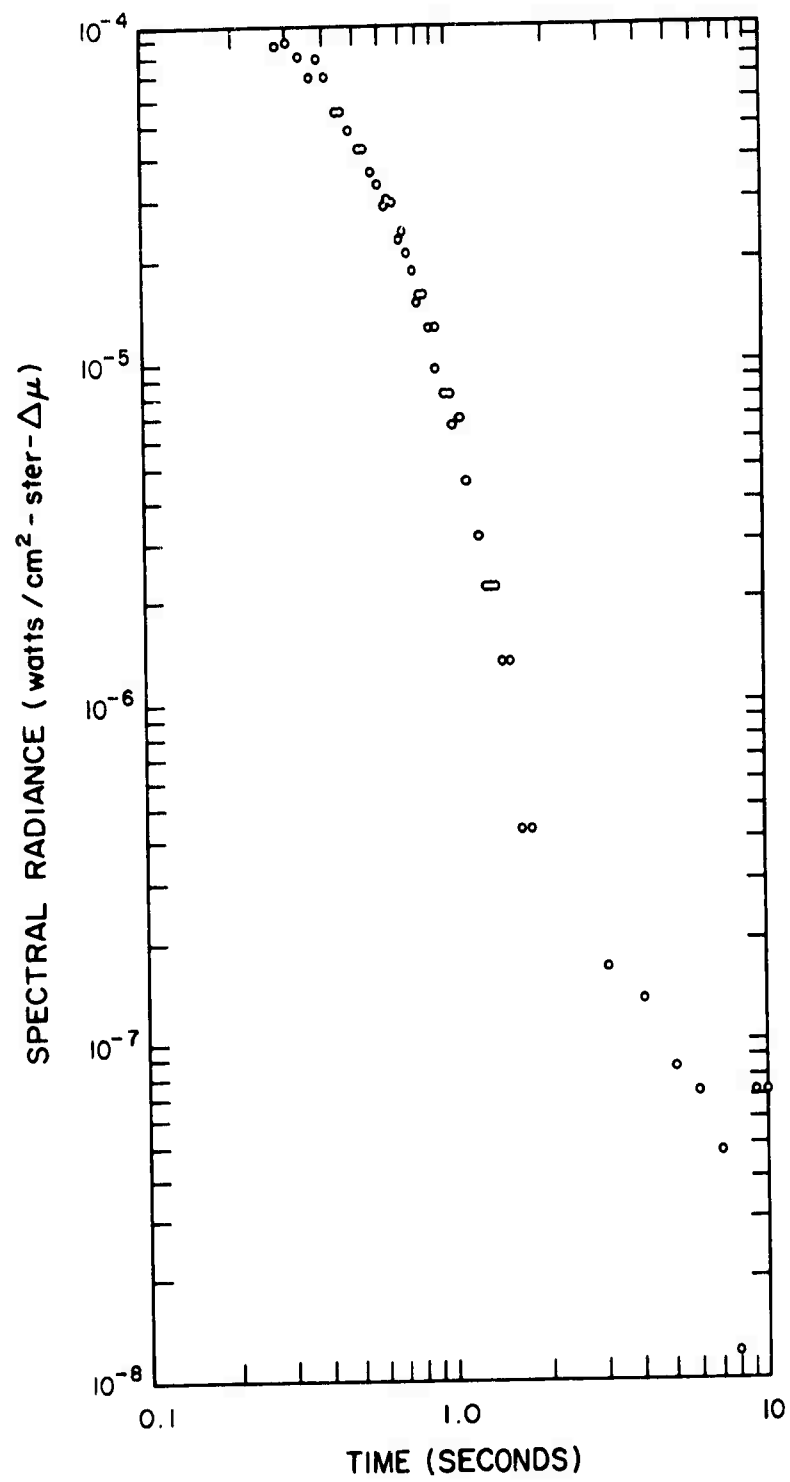


Figure 3.387 Spectral radiance, Kettle I, King Fish, Channel 20, early time.

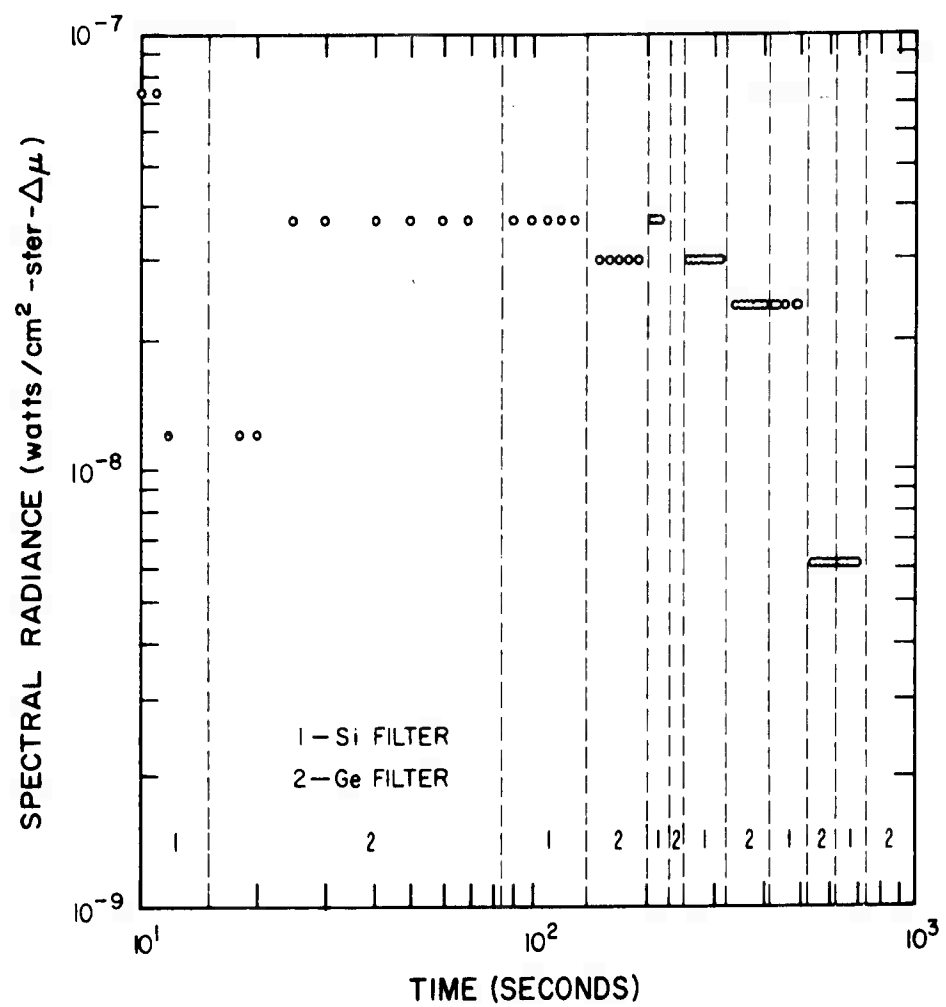


Figure 3.388 Spectral radiance, Kettle I, King Fish, Channel 20, late time.

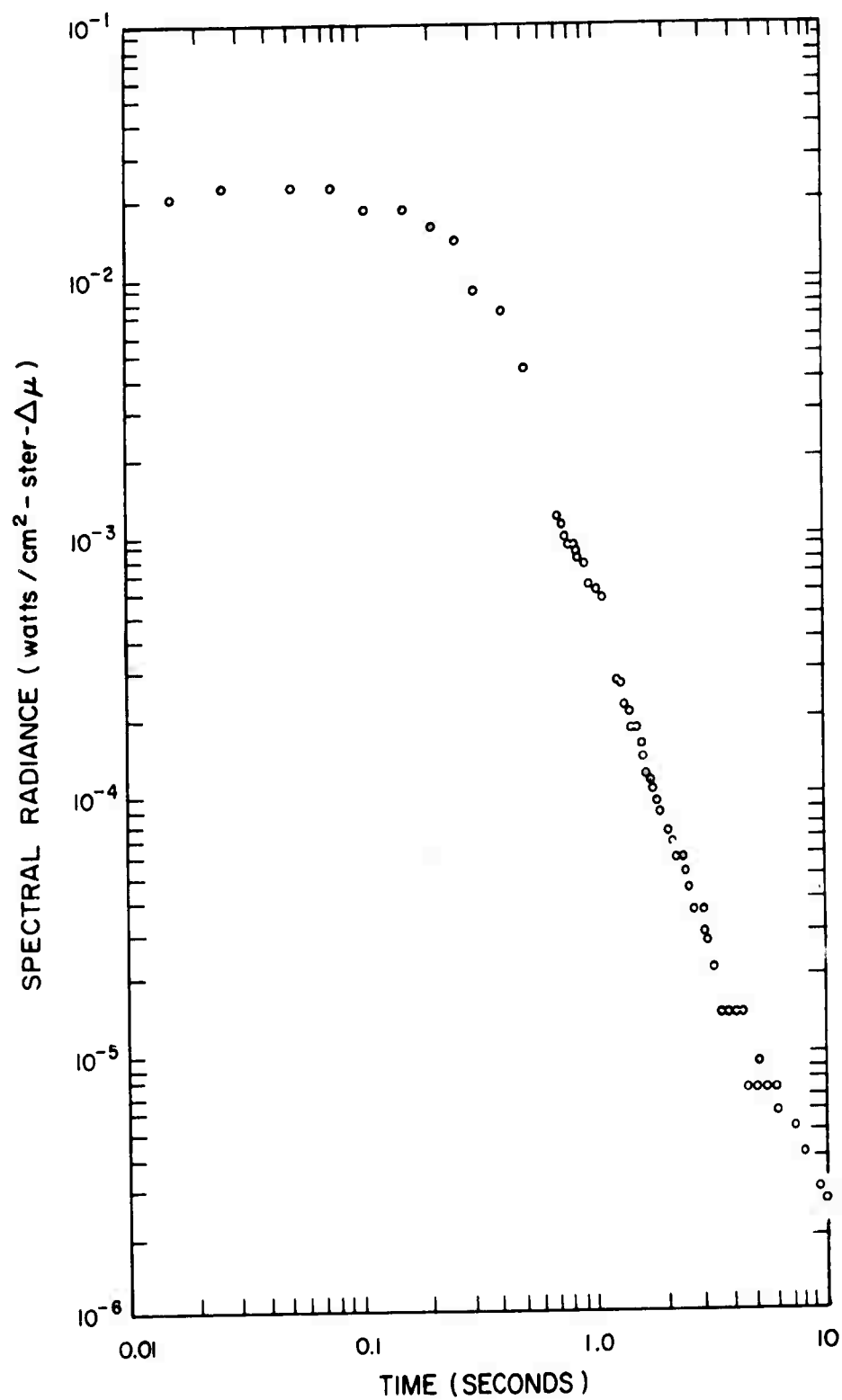


Figure 3.389 Spectral radiance, Kettle I, King Fish, Channel 21, early time.

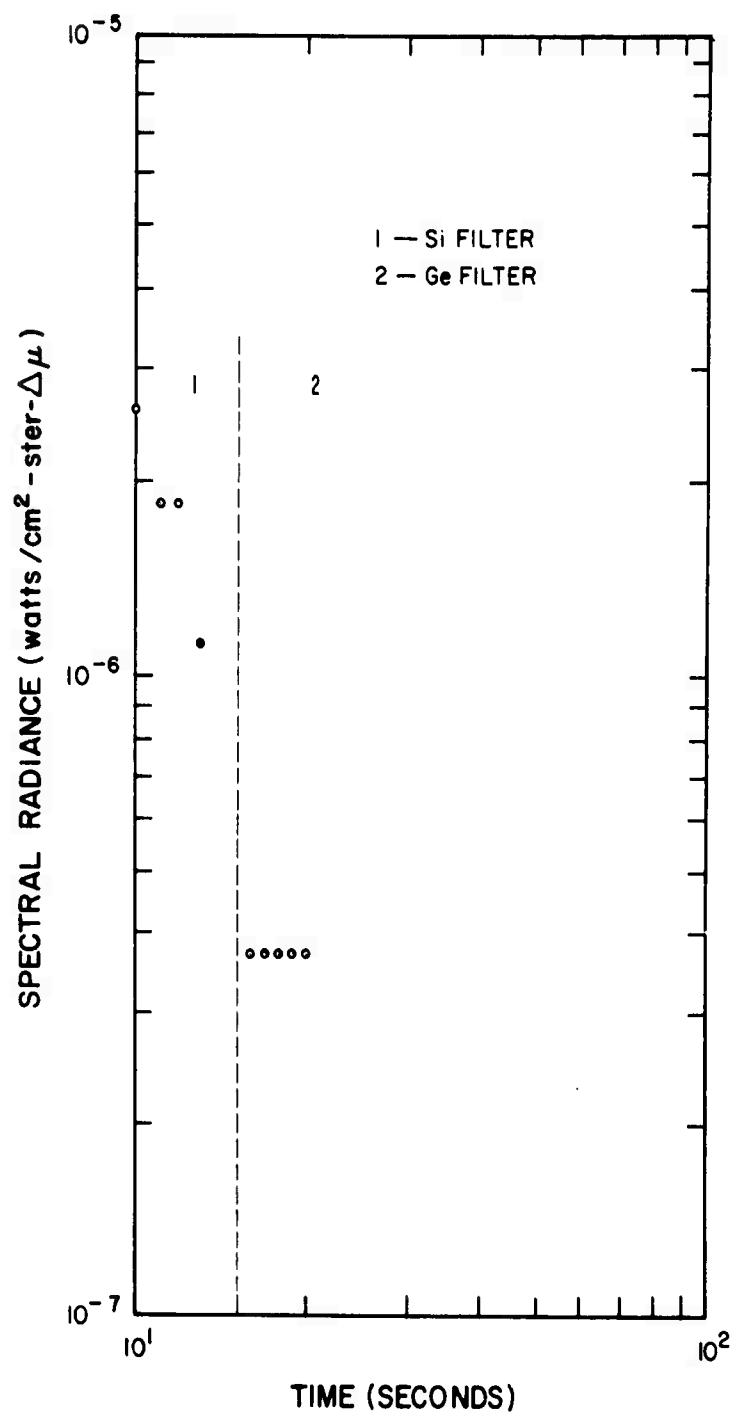


Figure 3.390 Spectral radiance, Kettle I, King Fish, Channel 21, late time.

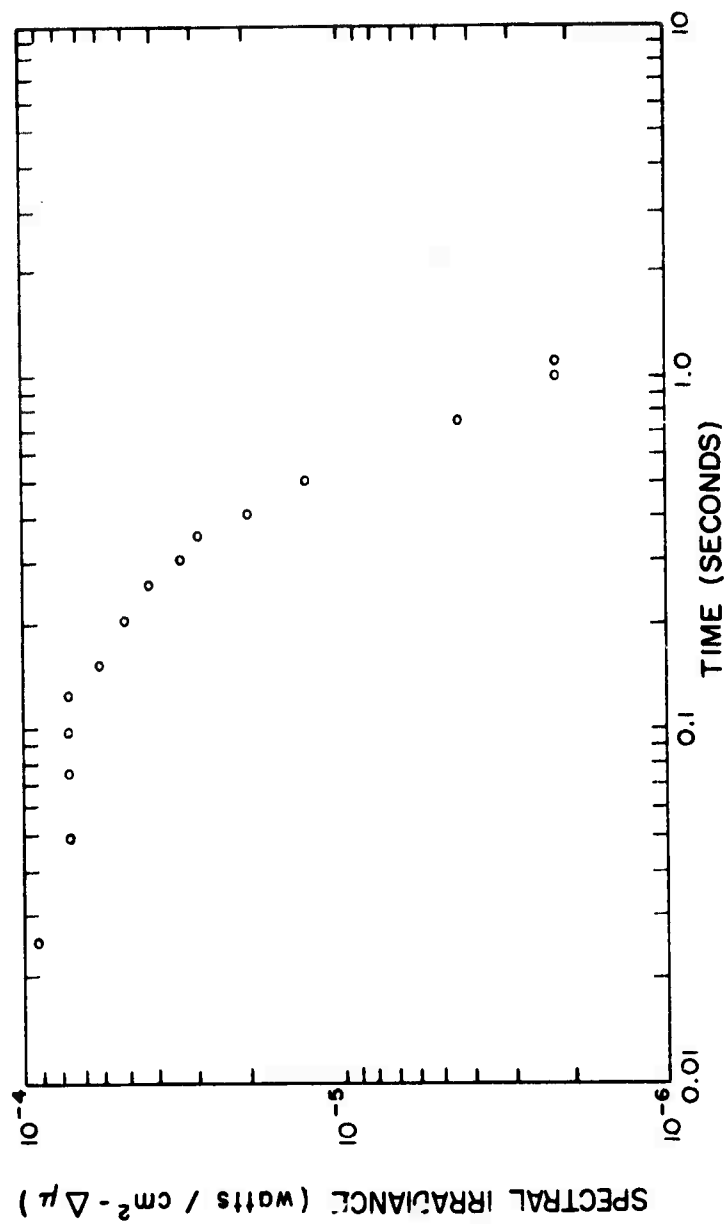


Figure 3.391 Spectral radiance, Kettle I, King Fish,
Channel 22.

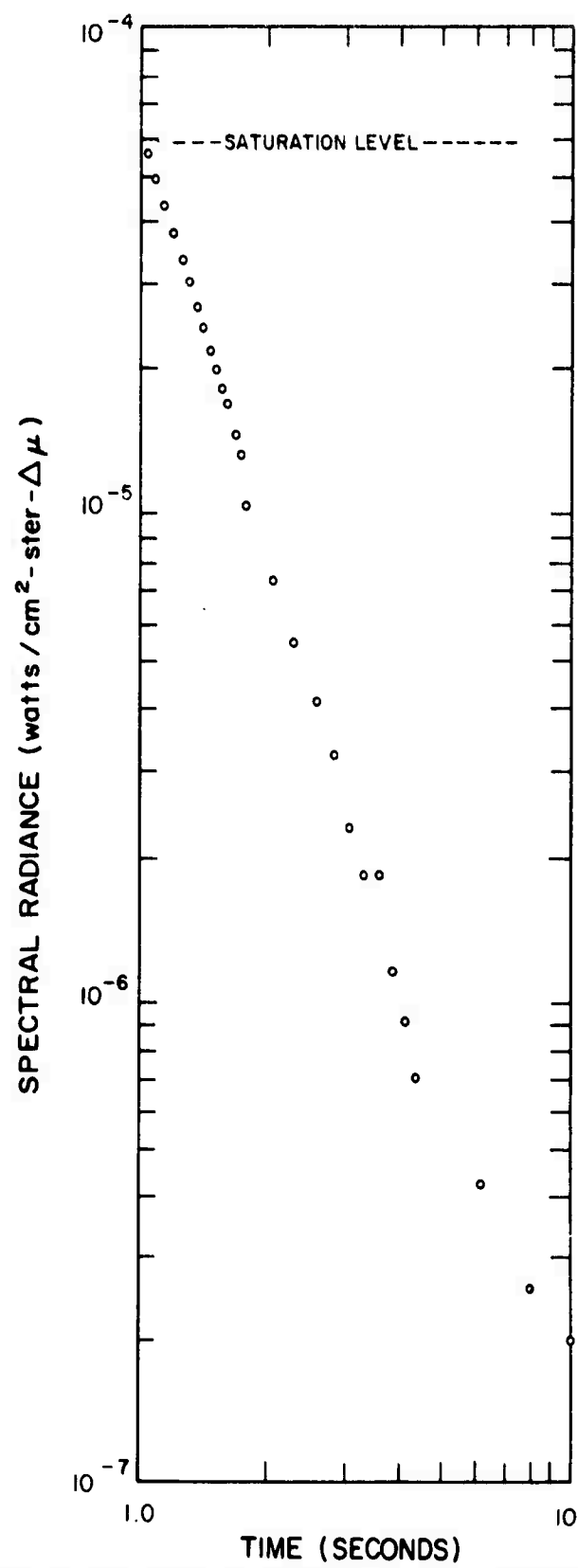


Figure 3.392 Spectral radiance, Kettle II, King Fish, Channel 1, early time.

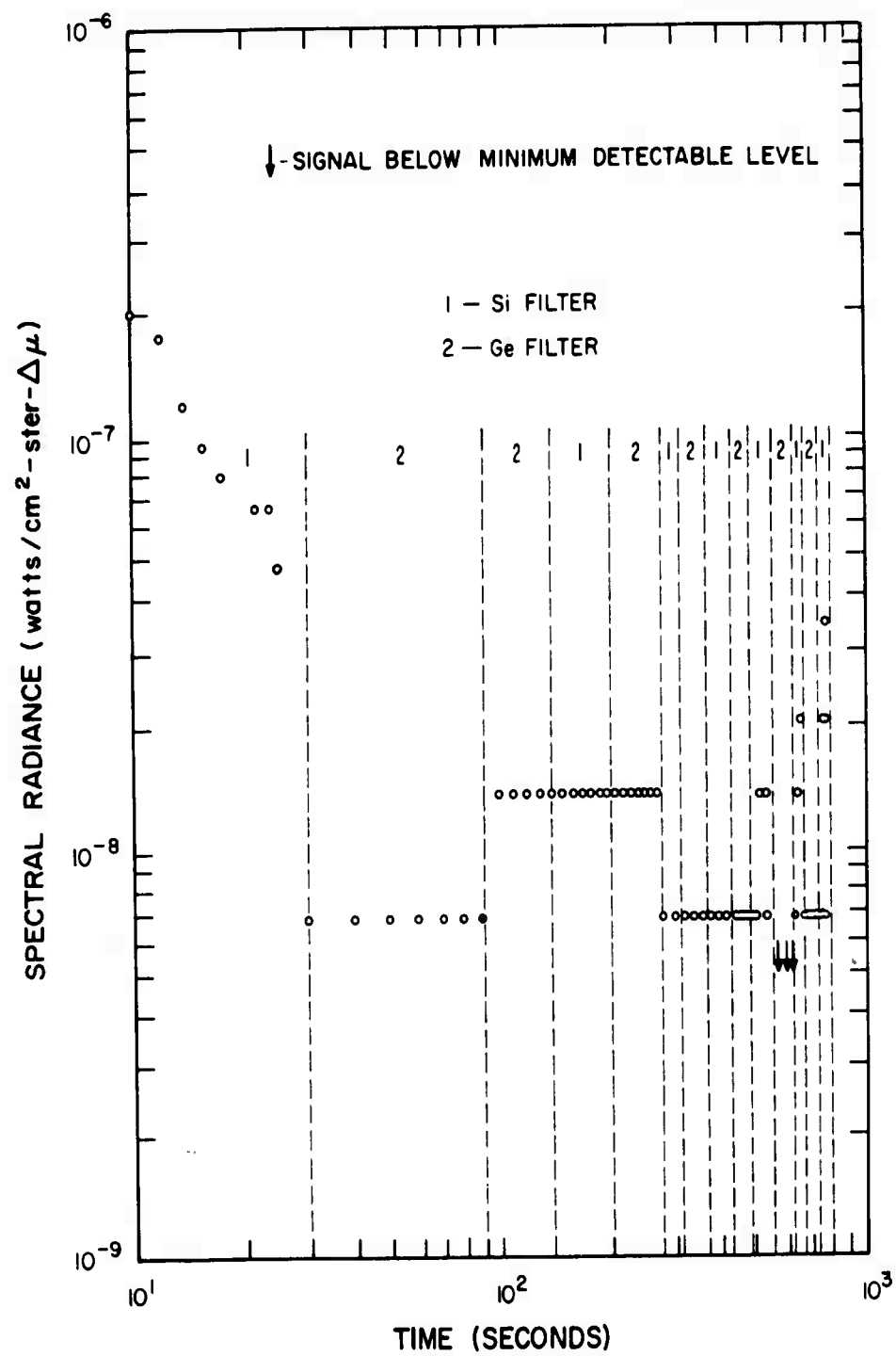


Figure 3.393 Spectral radiance, Kettle II, King Fish, Channel 1, late time.

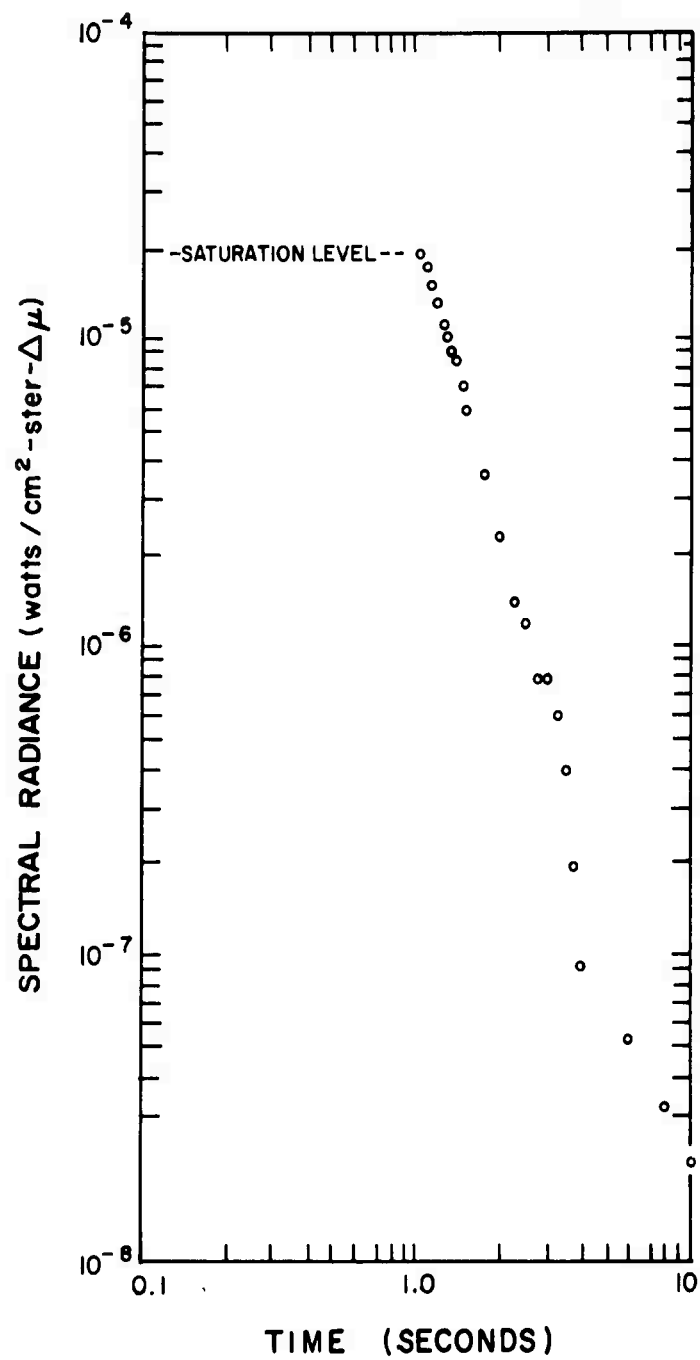


Figure 3.394 Spectral radiance, Kettle II, King Fish, Channel 2, early time.

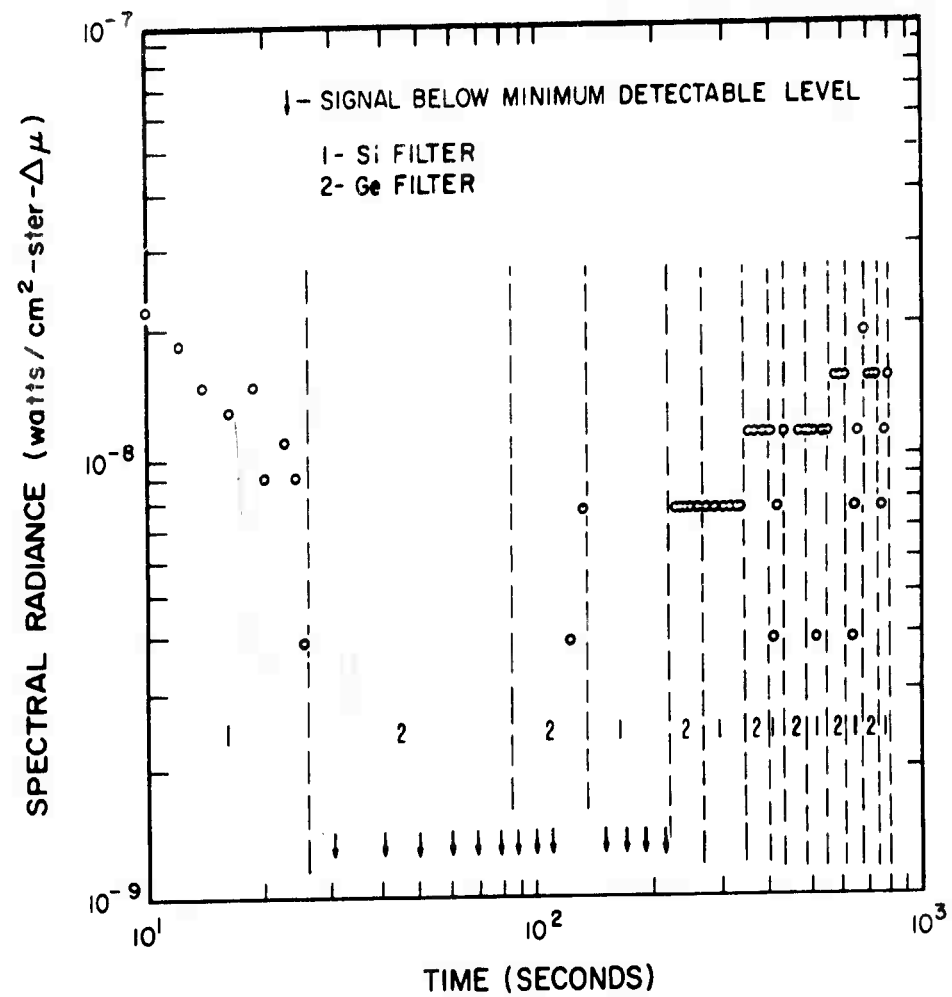


Figure 3.395 Spectral radiance, Kettle II, King Fish, Channel 2, late time.

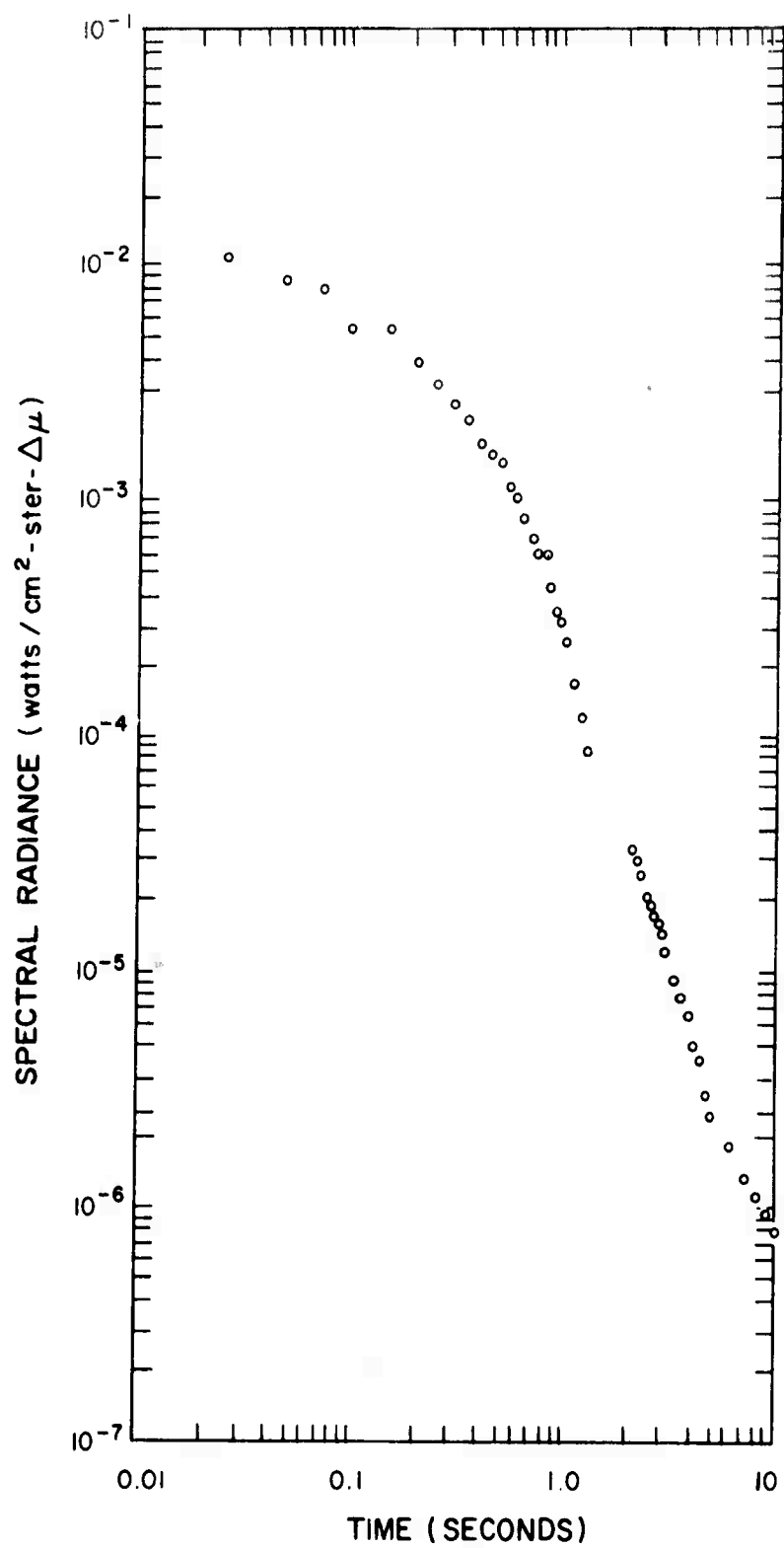


Figure 3.396 Spectral radiance, Kettle II, King Fish, Channel 3, early time.

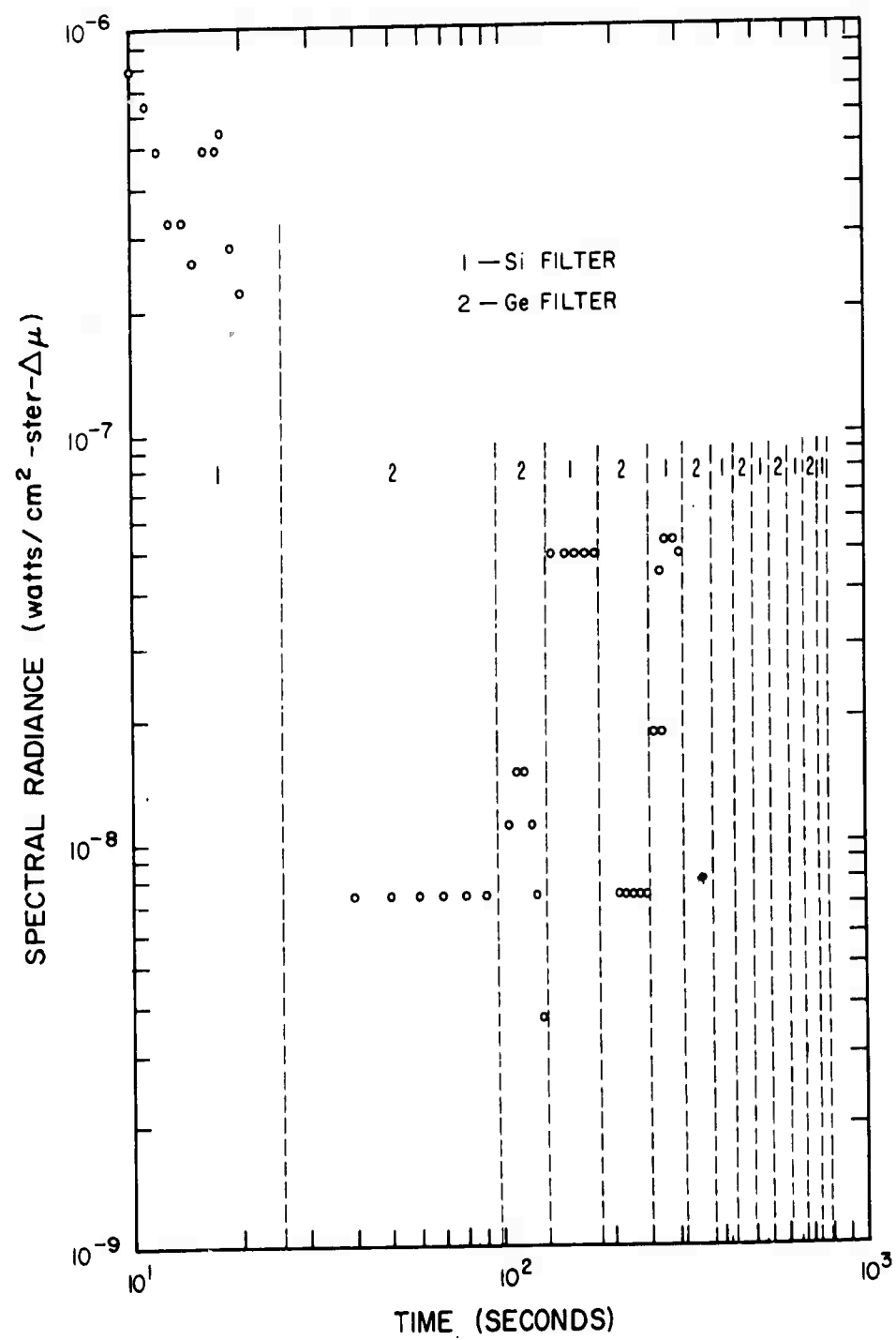


Figure 3.397 Spectral radiance, Kettle II, King Fish, Channel 3, late time.

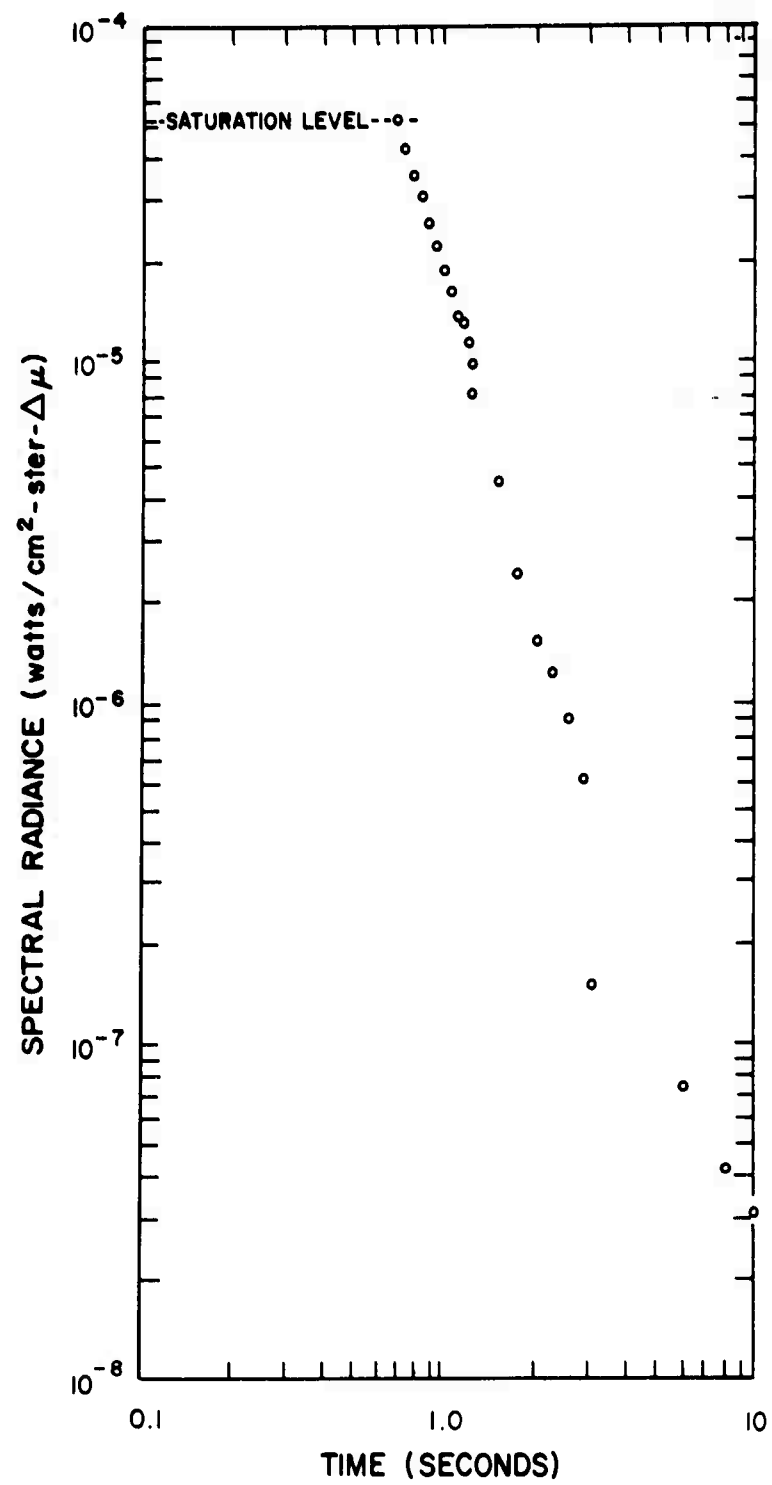


Figure 3.398 Spectral radiance, Kettle II, King Fish, Channel 4, early time.

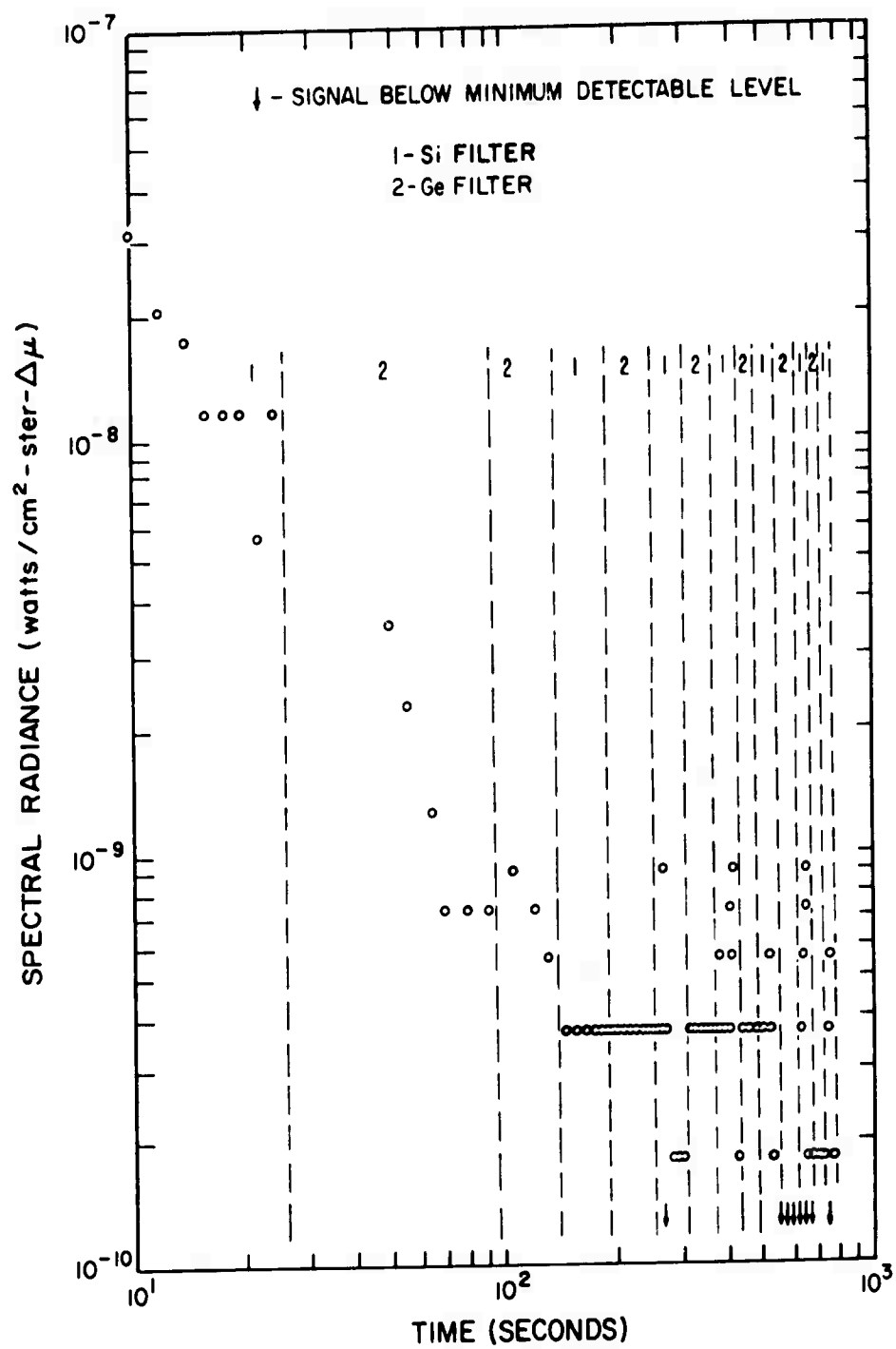


Figure 3.399 Spectral radiance, Kettle II, King Fish, Channel 4, late time.

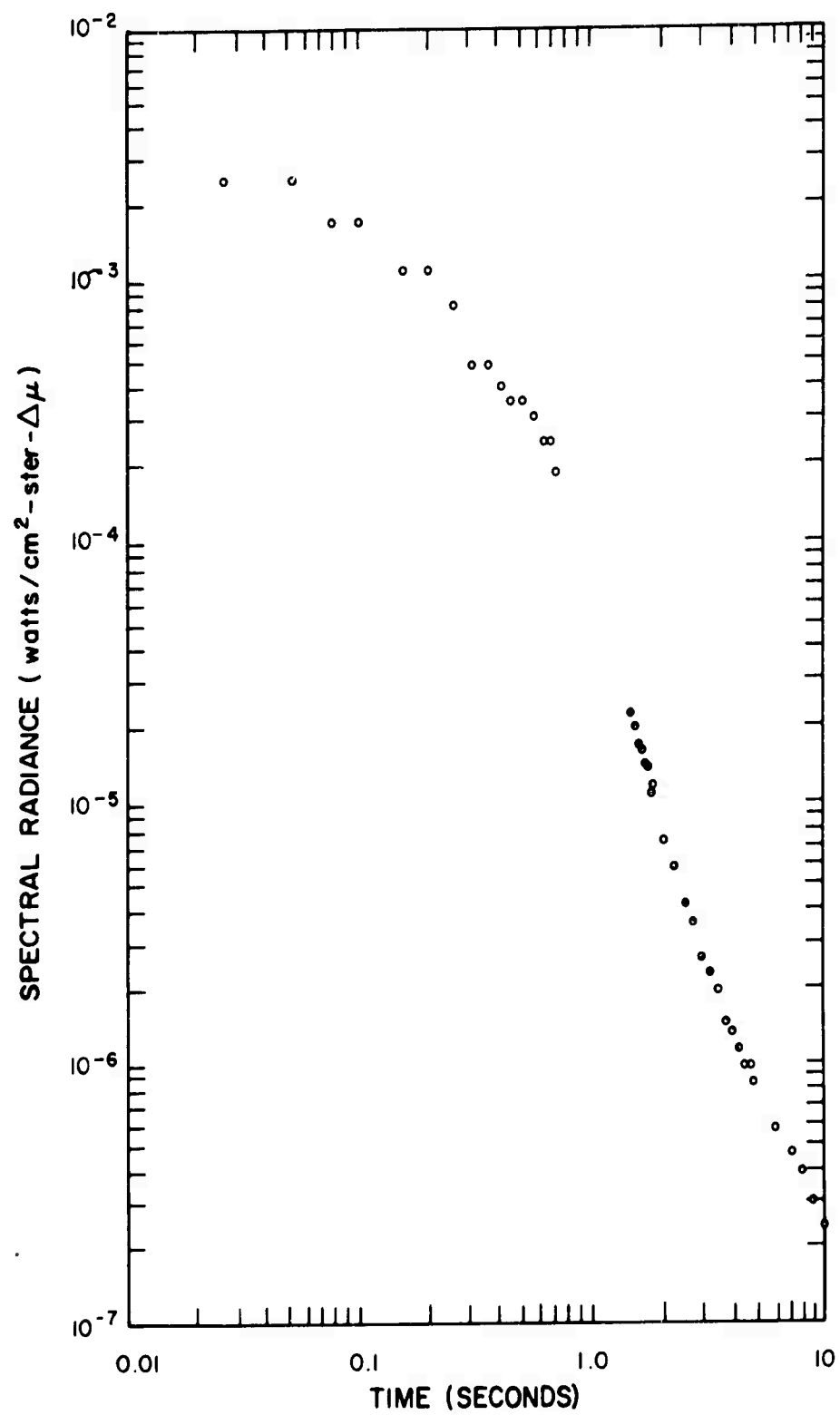


Figure 3.400 Spectral radiance, Kettle II; King Fish, Channel 5, early time.

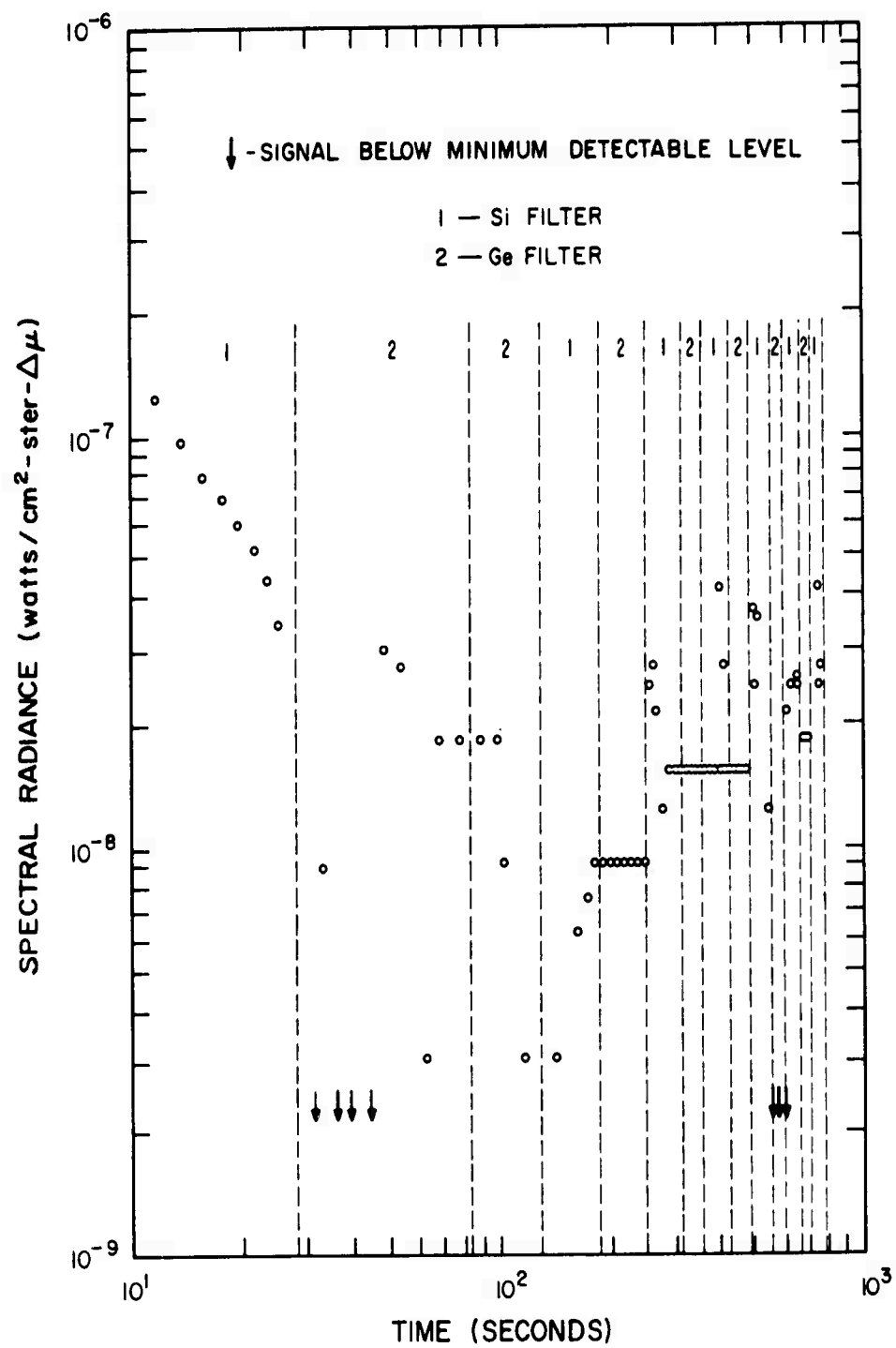


Figure 3.401 Spectral radiance, Kettle II, King Fish, Channel 5, late time.

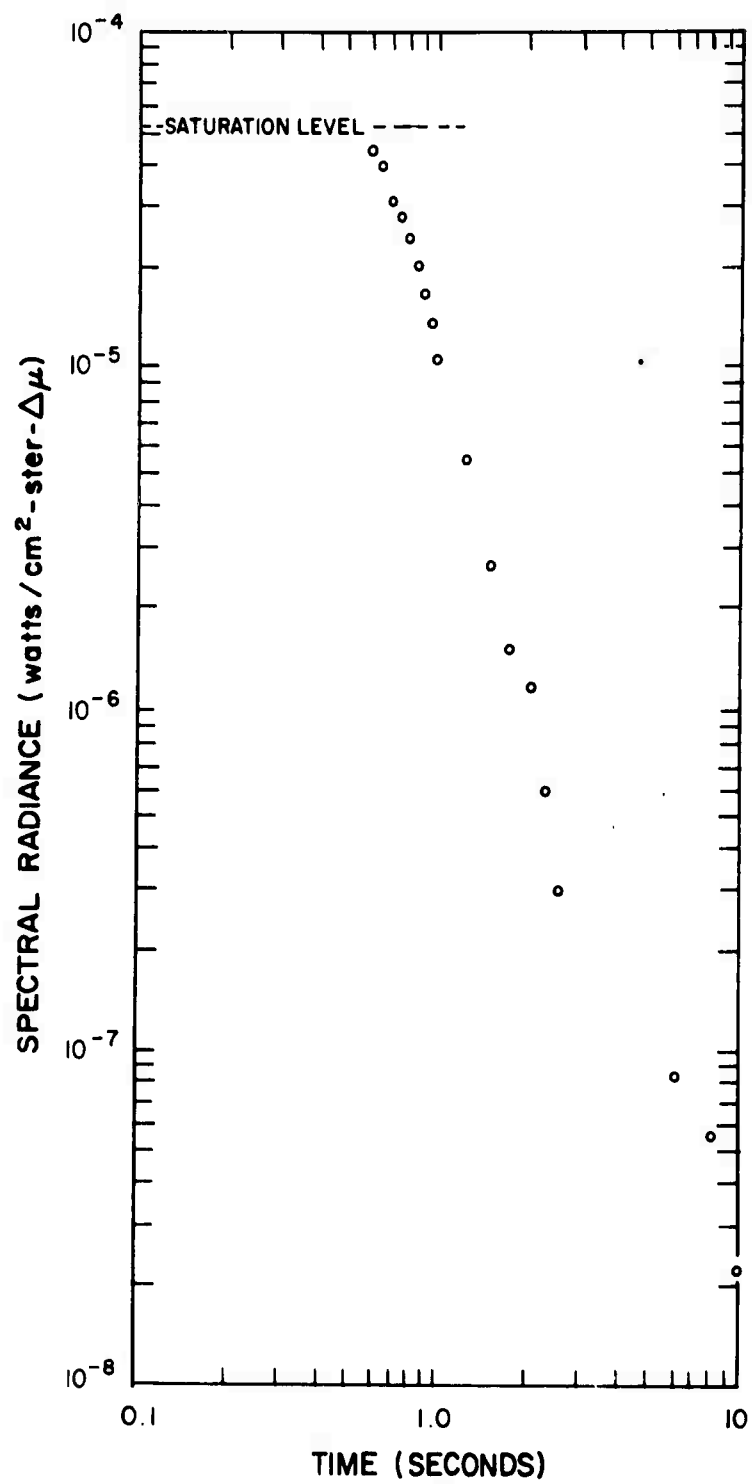


Figure 3.402 Spectral radiance, Kettle II, King Fish, Channel 6, early time.

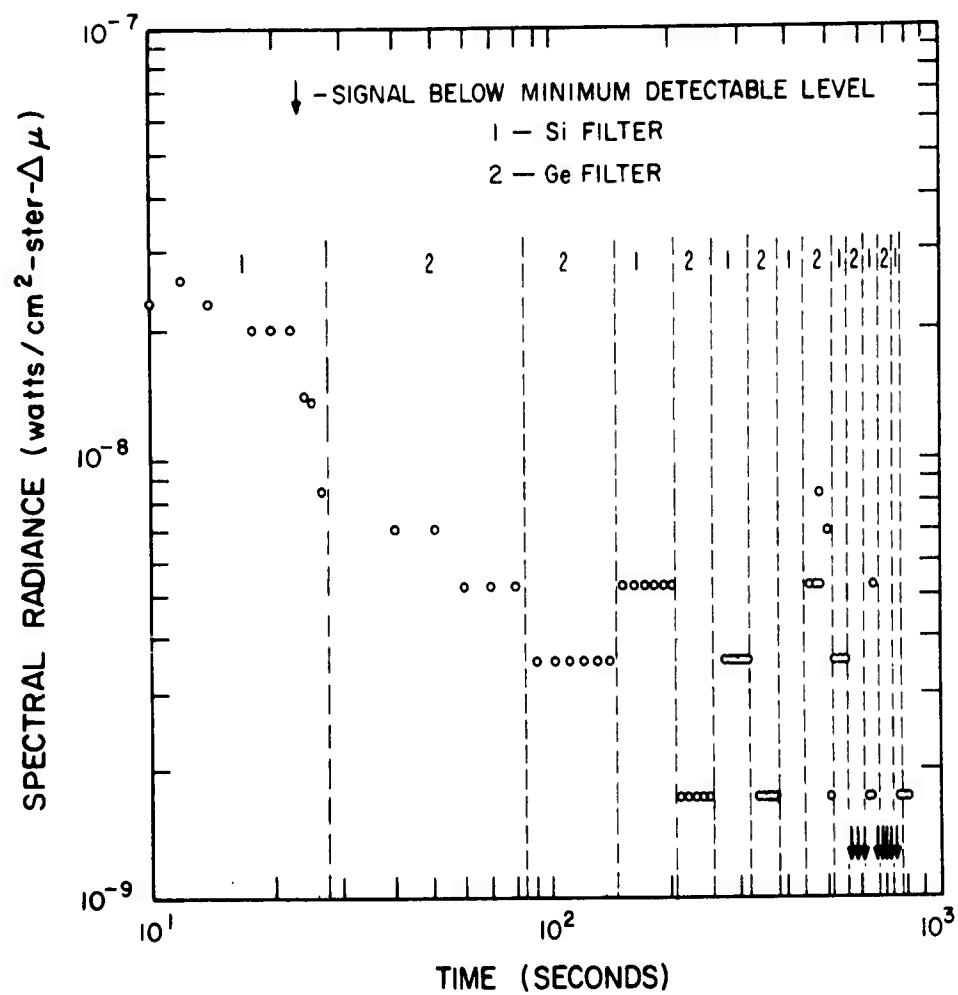


Figure 3.403 Spectral radiance, Kettle II, King Fish, Channel 6, late time.

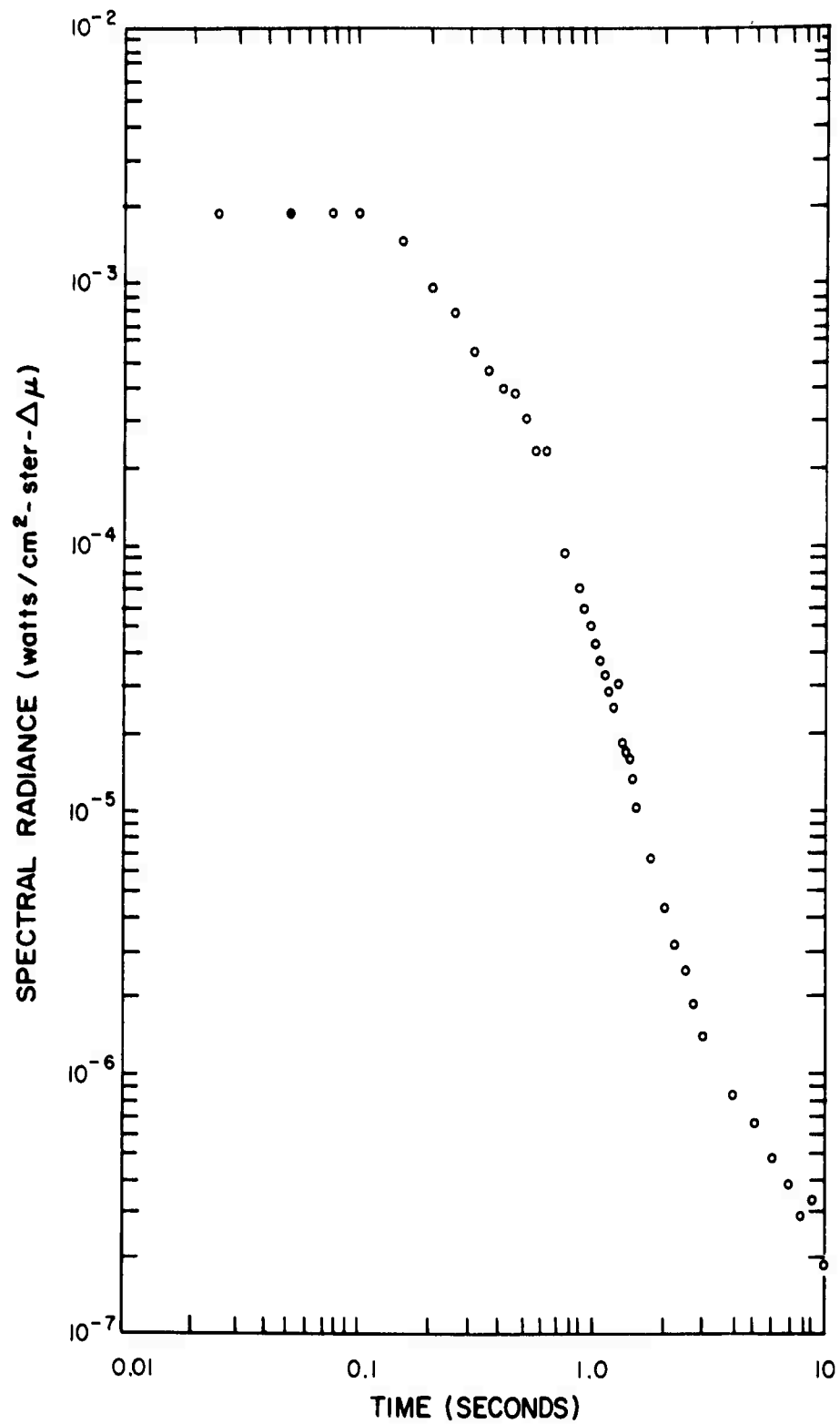


Figure 3.404 Spectral radiance, Kettle II, King Fish, Channel 7, early time.

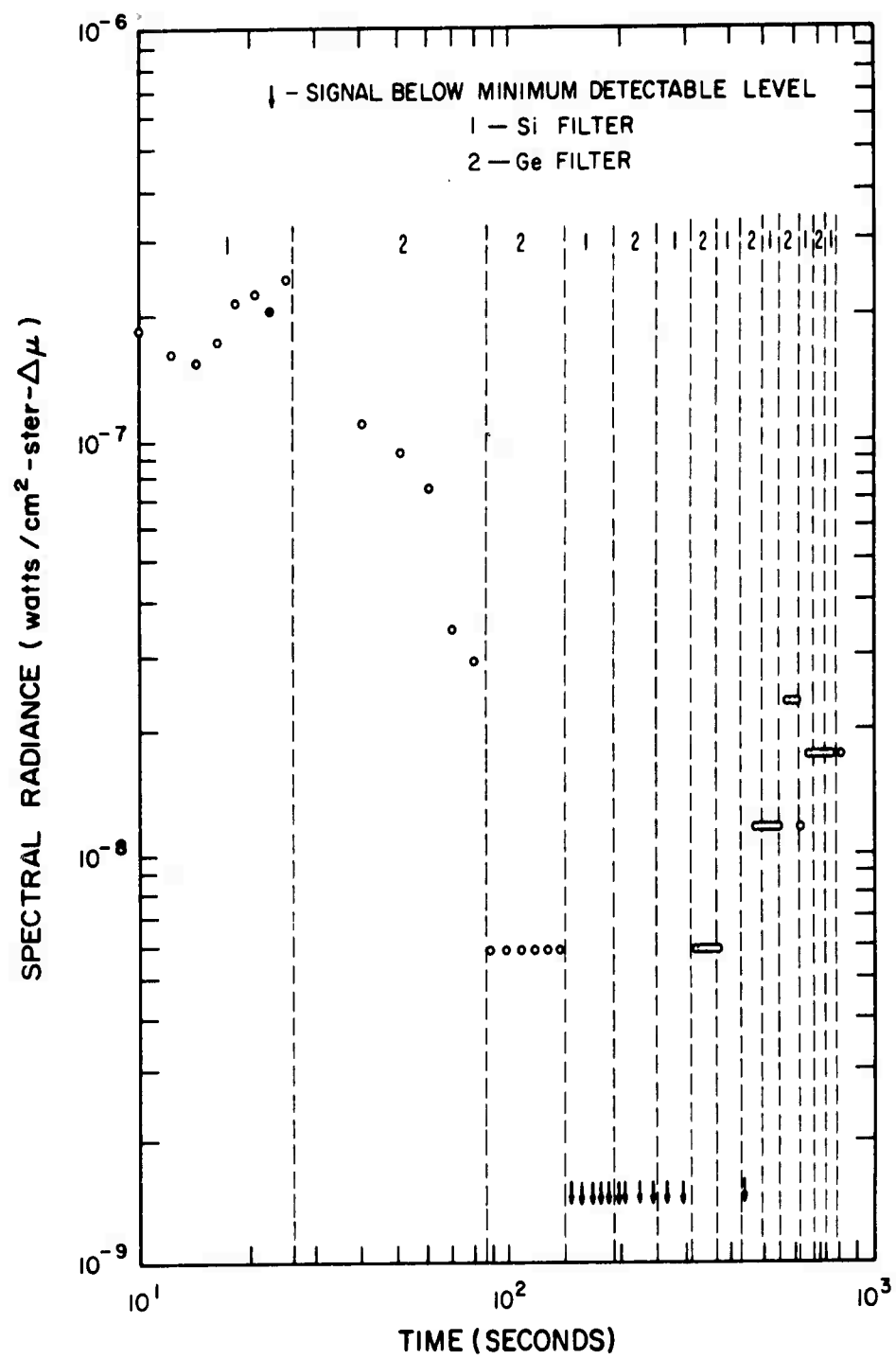


Figure 3.405 Spectral radiance, Kettle II, King Fish, Channel 7, late time.

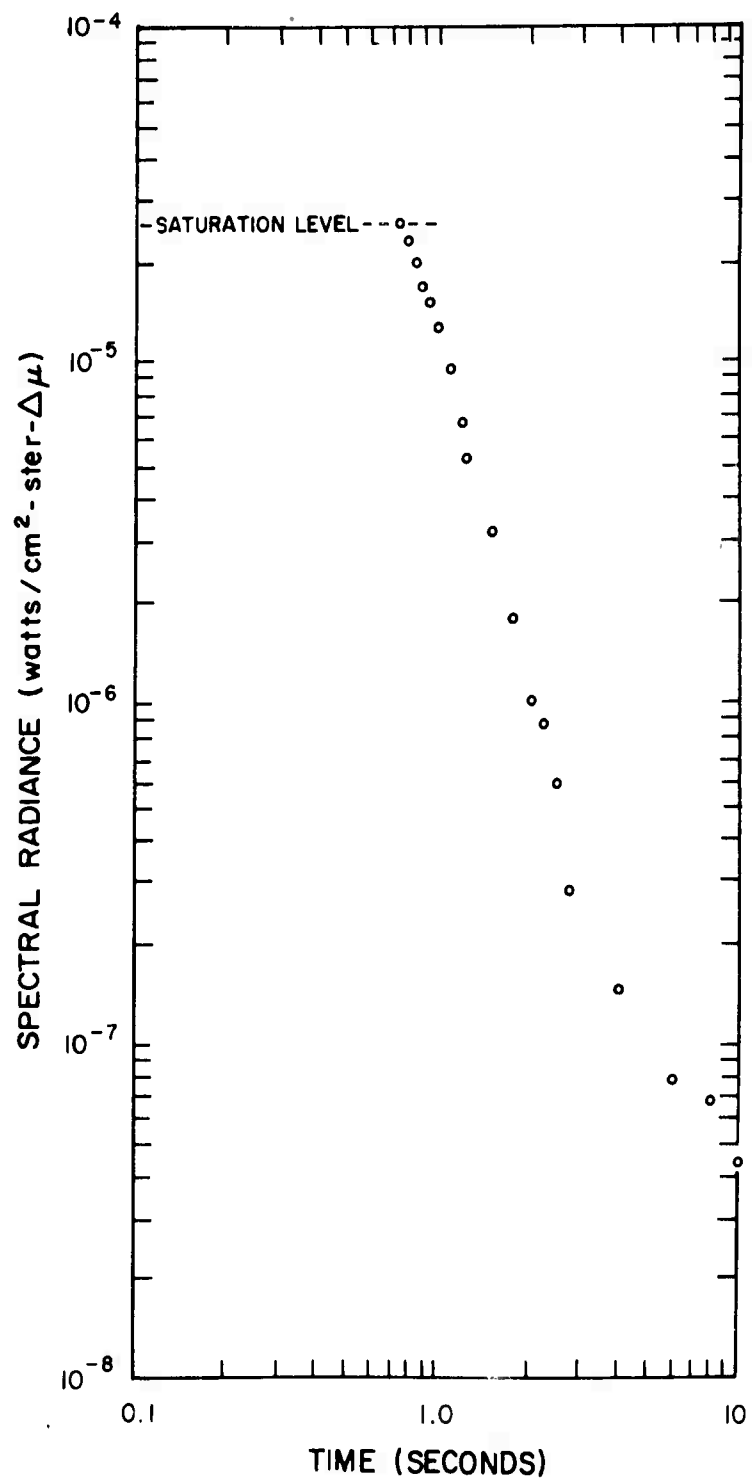


Figure 3.406 Spectral radiance, Kettle II, King Fish, Channel 8, early time.

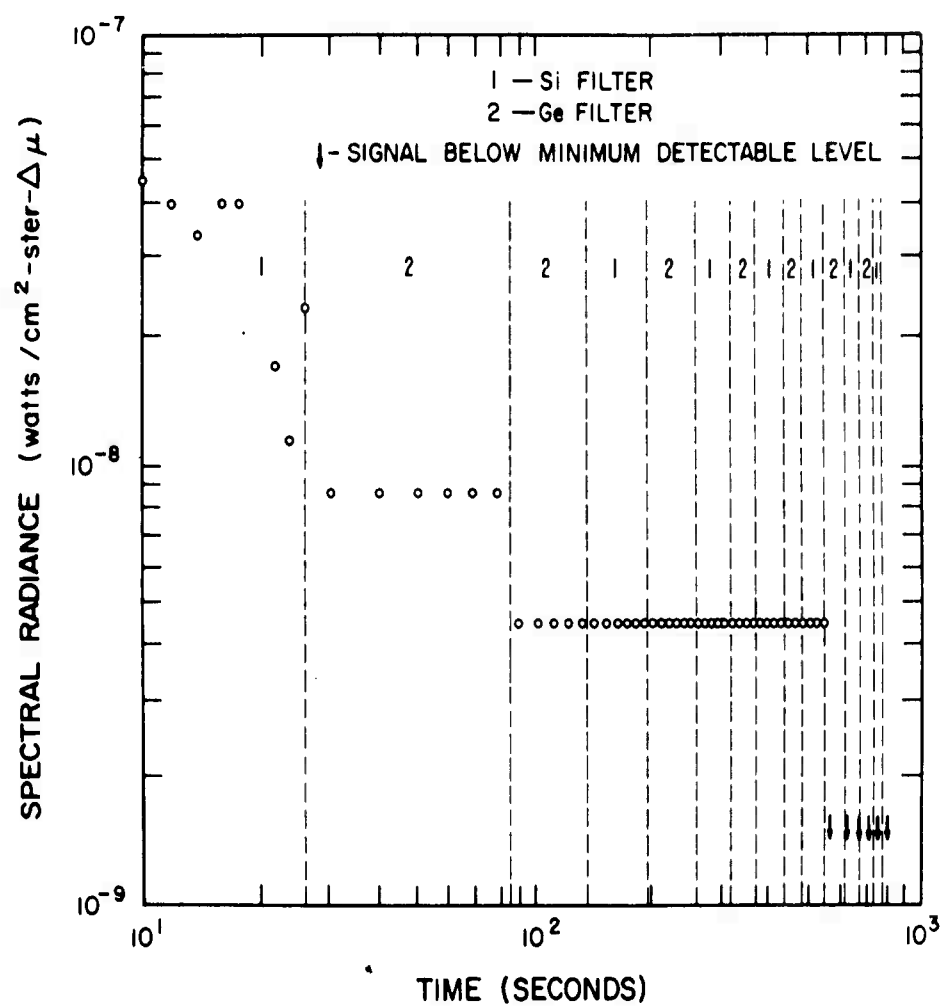


Figure 3.407 Spectral radiance, Kettle II, King Fish, Channel 8, late time.

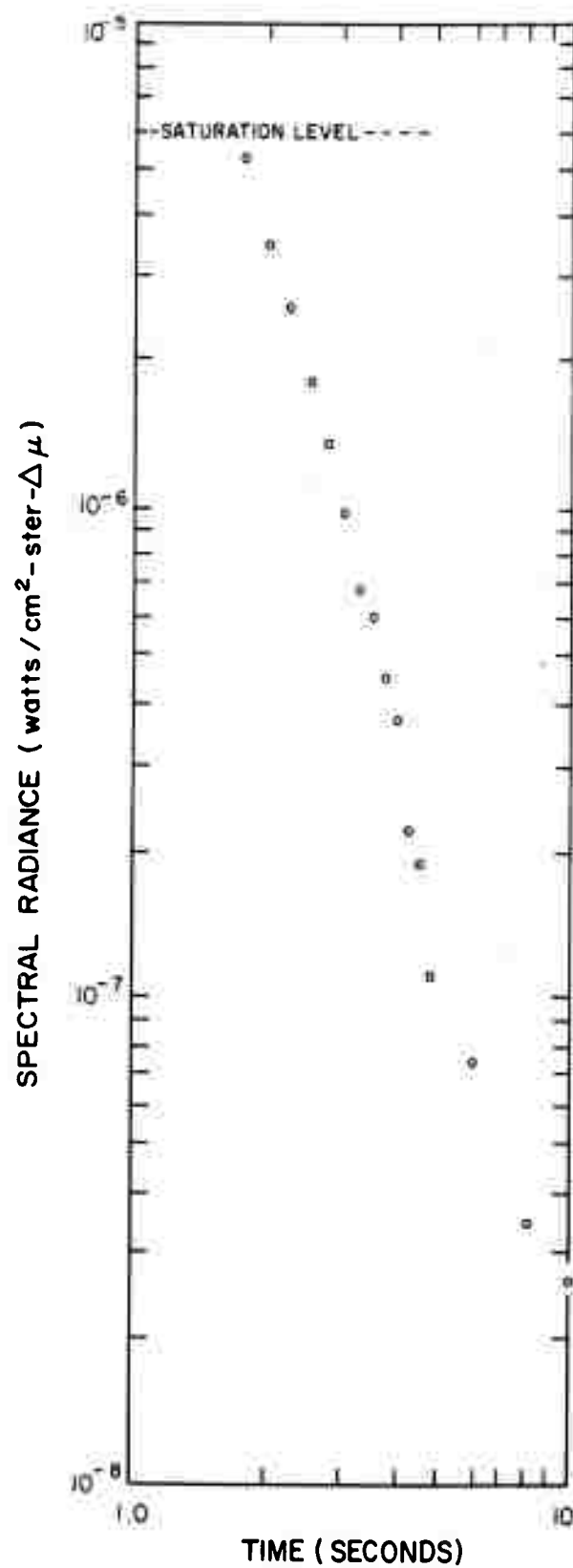


Figure 3.408 Spectral radiance, Kettle II, King Fish, Channel 9, early time.

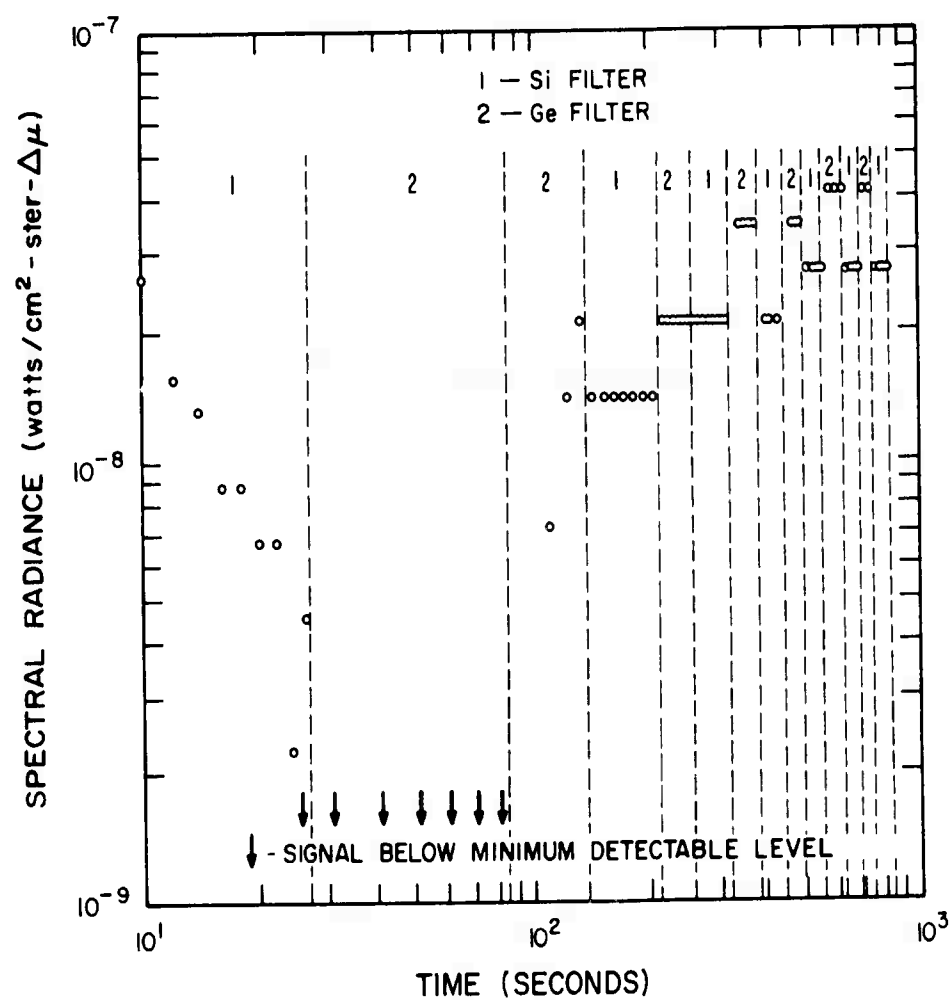


Figure 3.409 Spectral radiance, Kettle II, King Fish, Channel 9, late time.

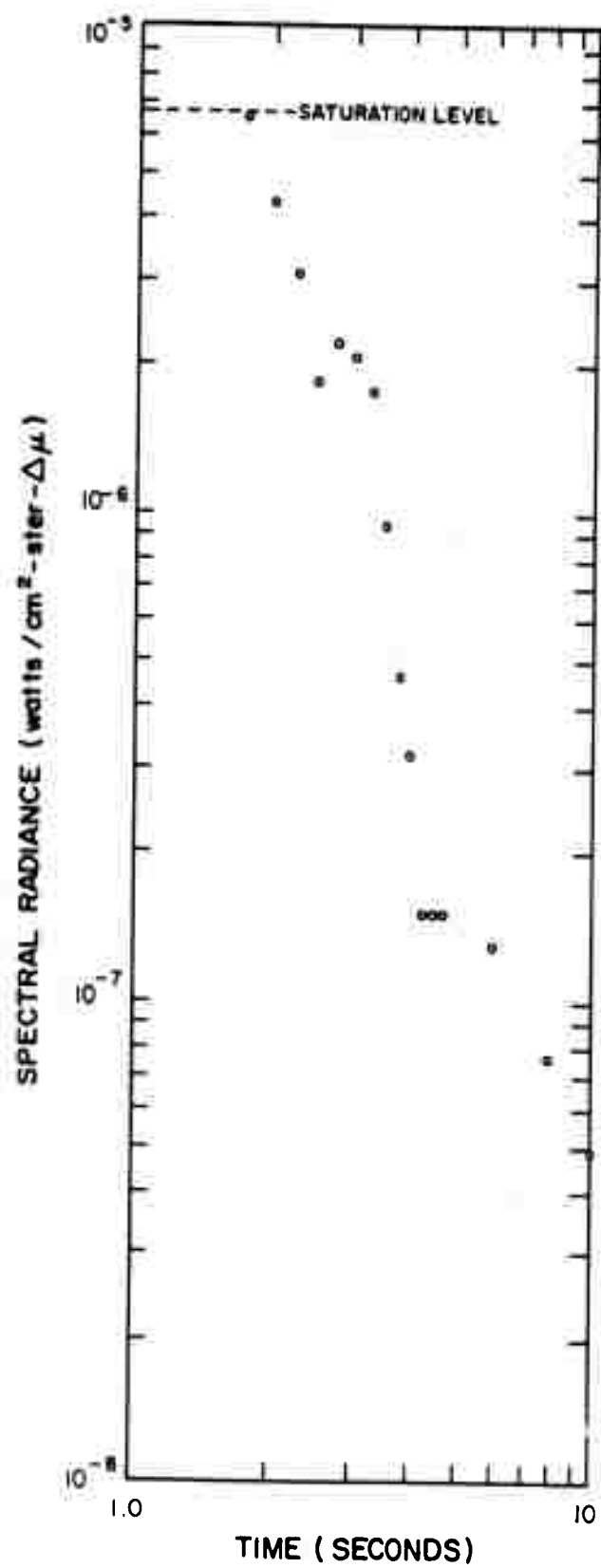


Figure 3.410 Spectral radiance, Kettle II, King Fish, Channel 14, early time.

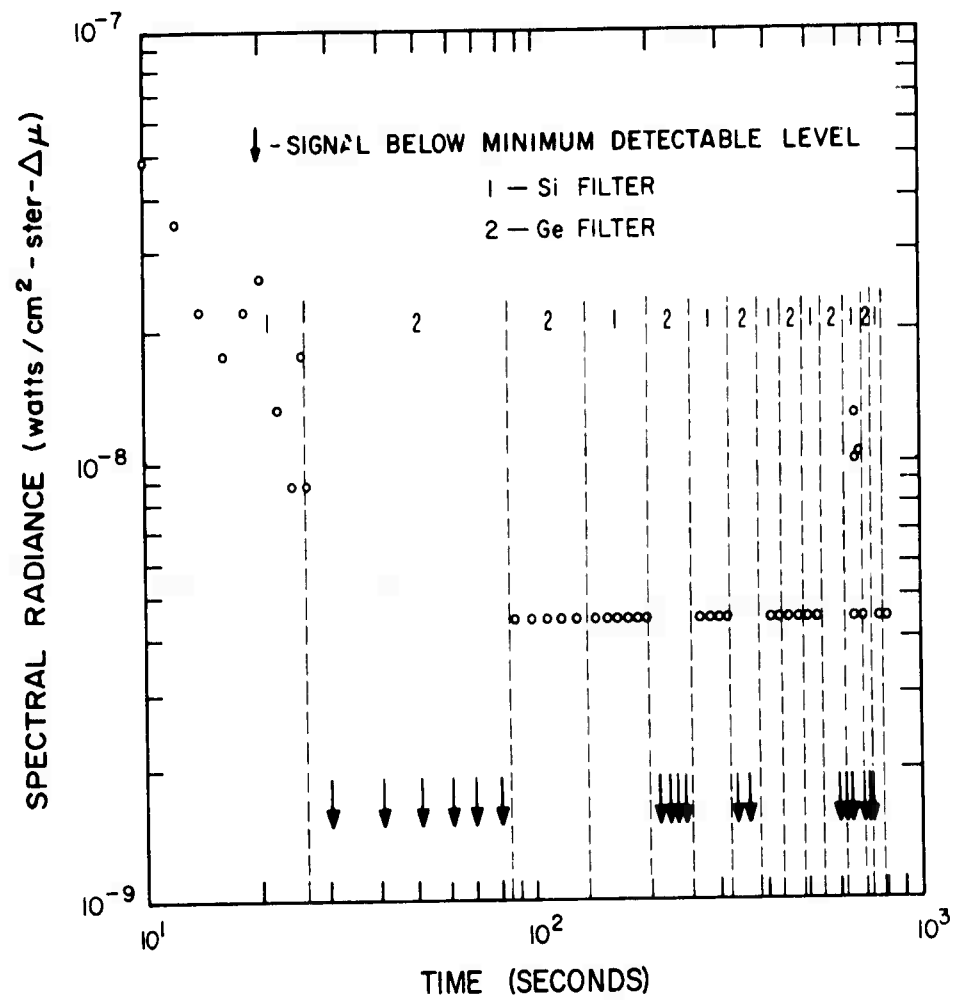


Figure 3.411 Spectral radiance, Kettle II, King Fish, Channel 14, late time.

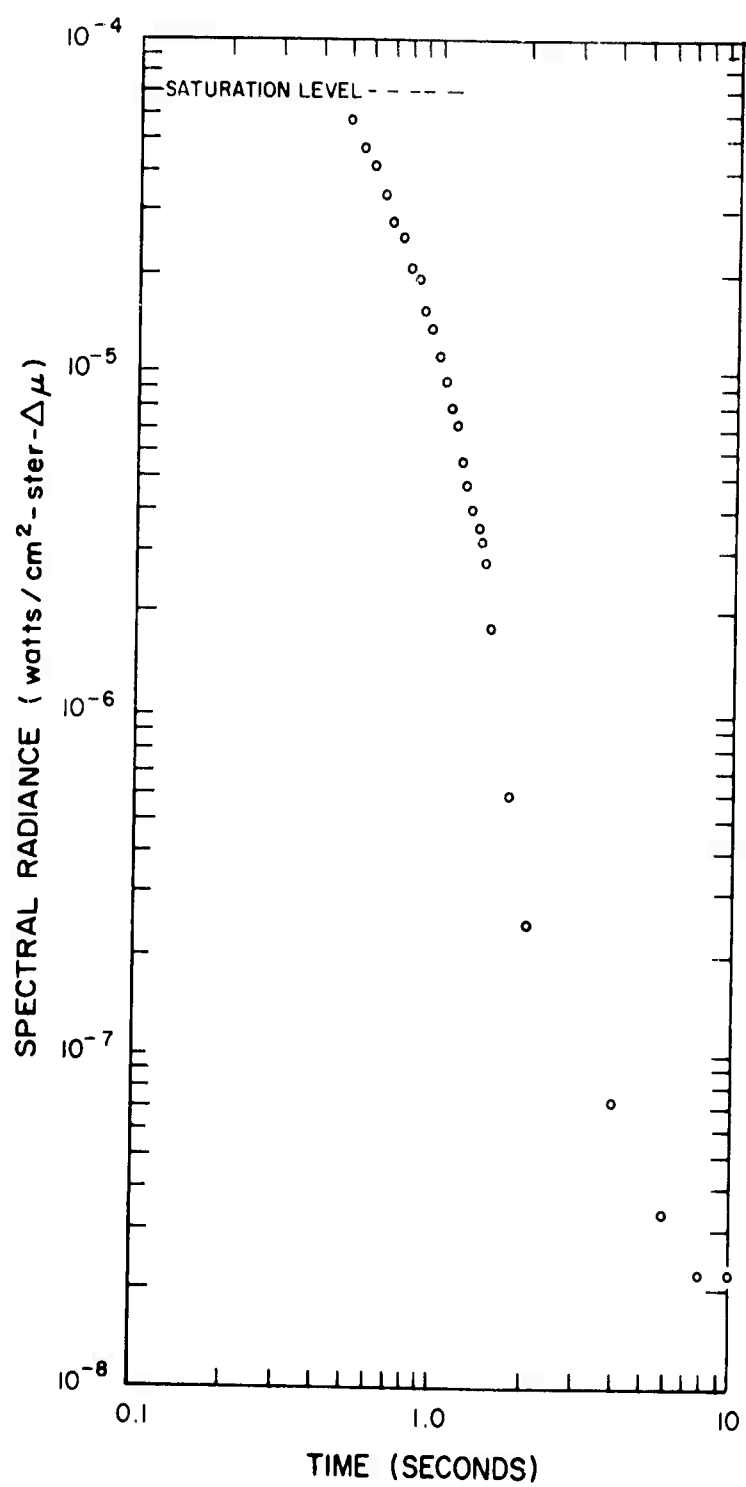


Figure 3.412 Spectral radiance, Kettle II, King Fish, Channel 15, early time.

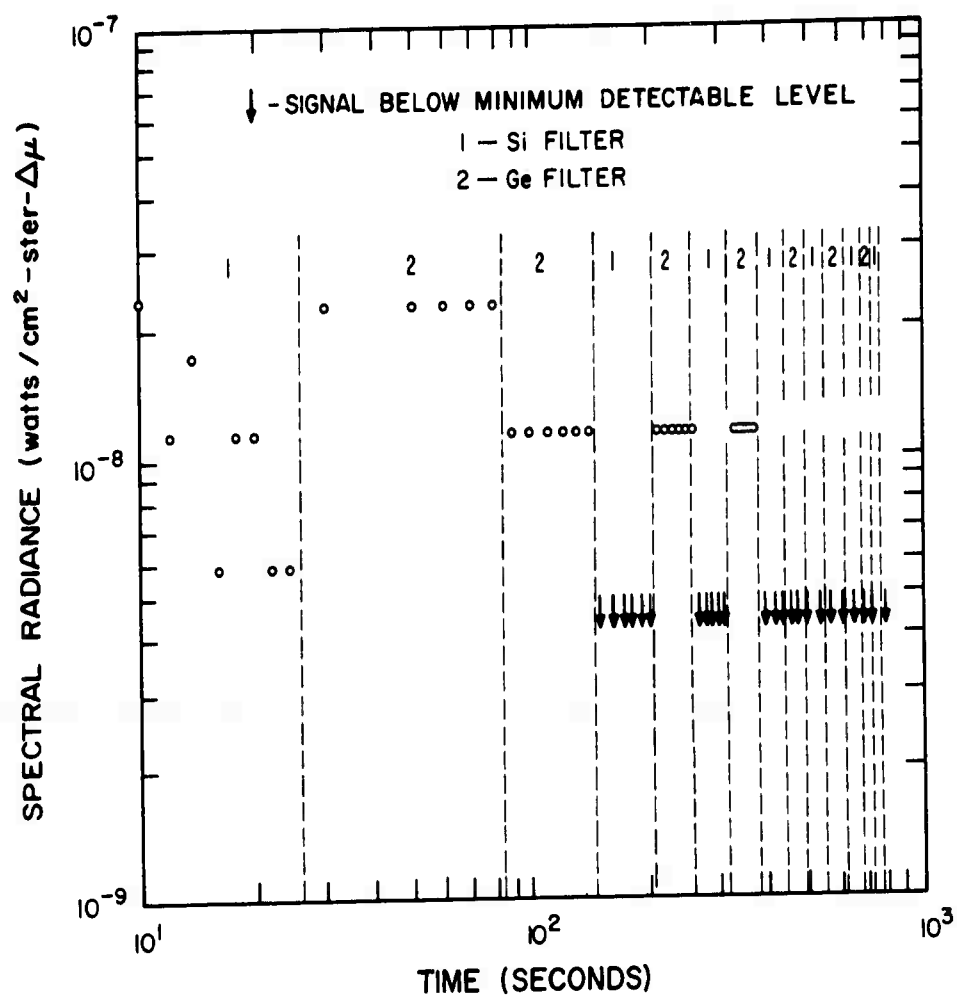


Figure 3.413 Spectral radiance, Kettle II, King Fish, Channel 15, late time.

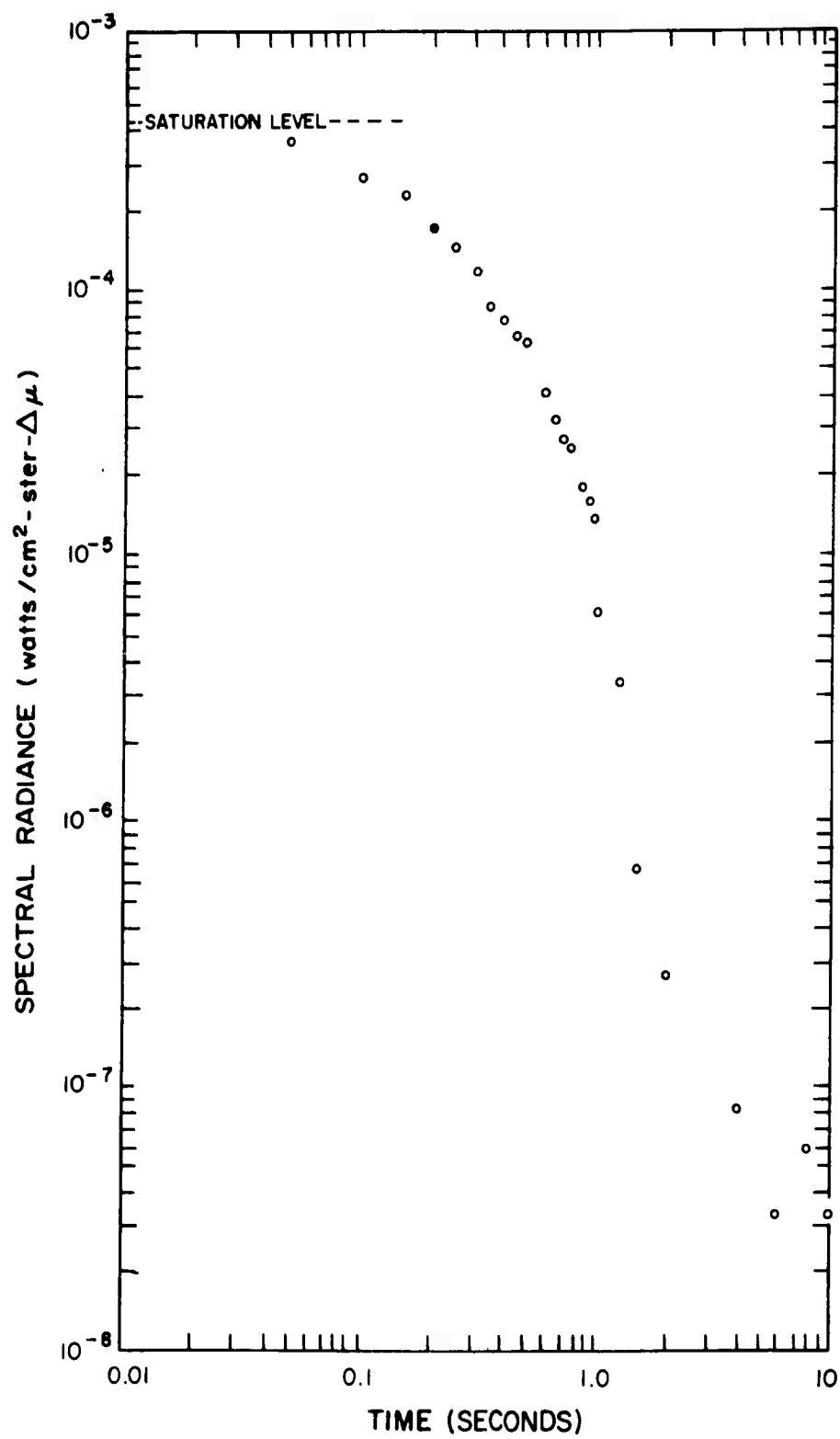


Figure 3.414 Spectral radiance, Kettle II, King Fish, Channel 16, early time.

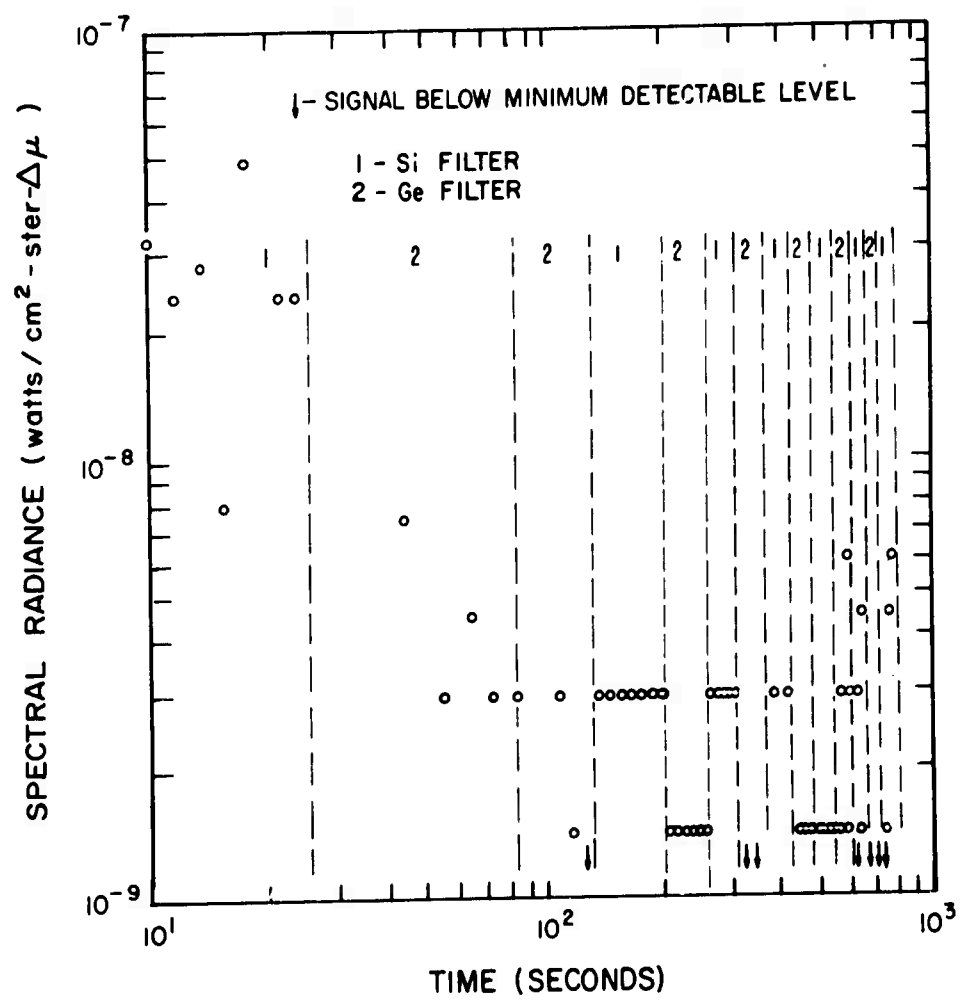


Figure 3.415 Spectral radiance, Kettle II, King Fish, Channel 16, late time.

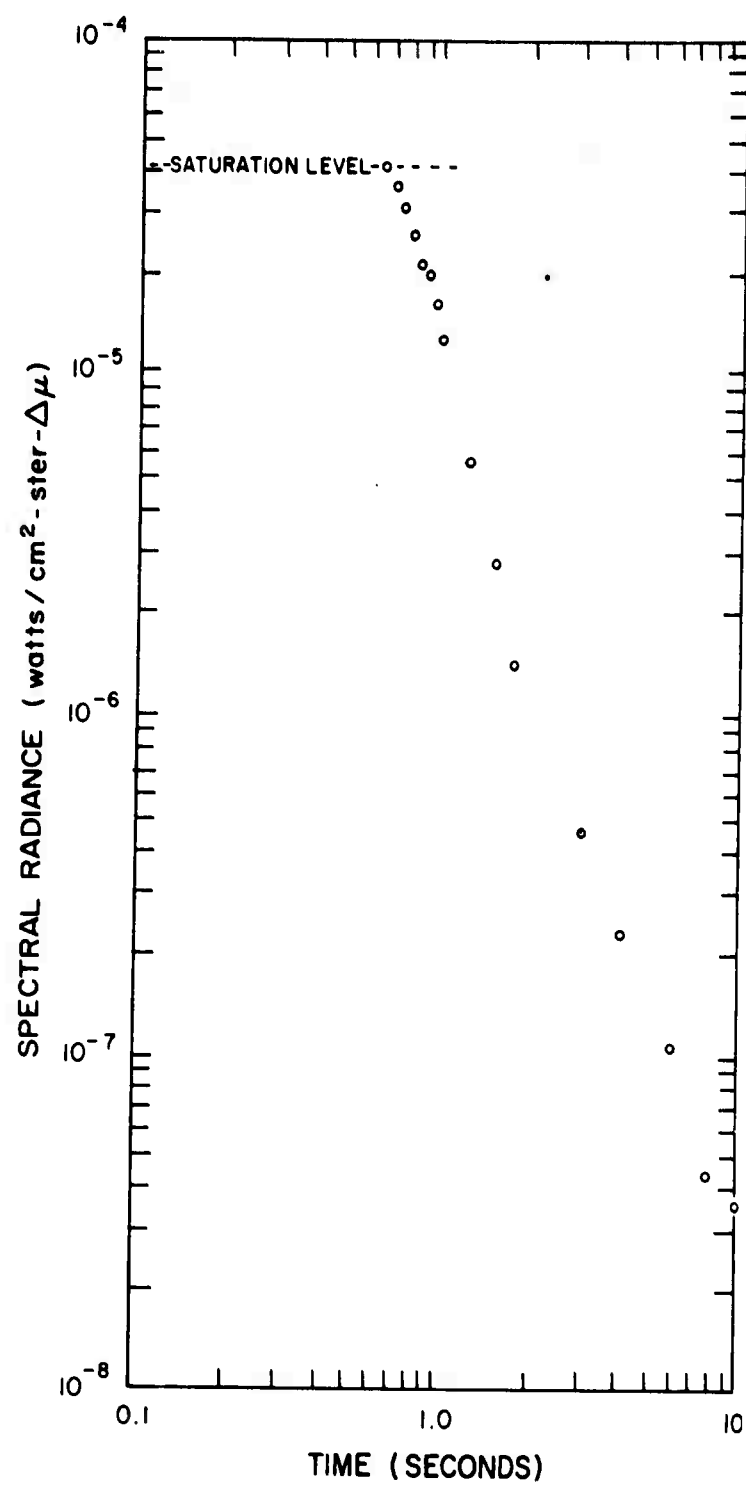


Figure 3.416 Spectral radiance, Kettle II, King Fish, Channel 17, early time.

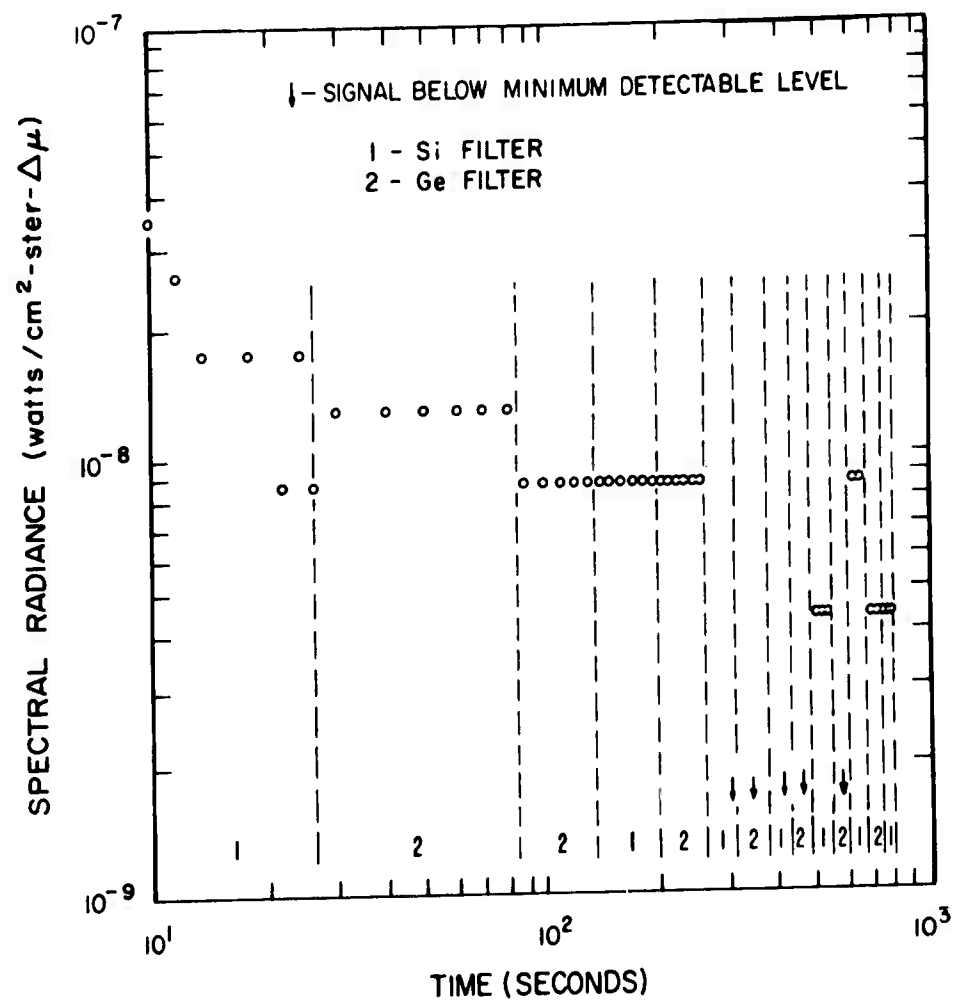


Figure 3.417 Spectral radiance, Kettle II, King Fish, Channel 17, late time.

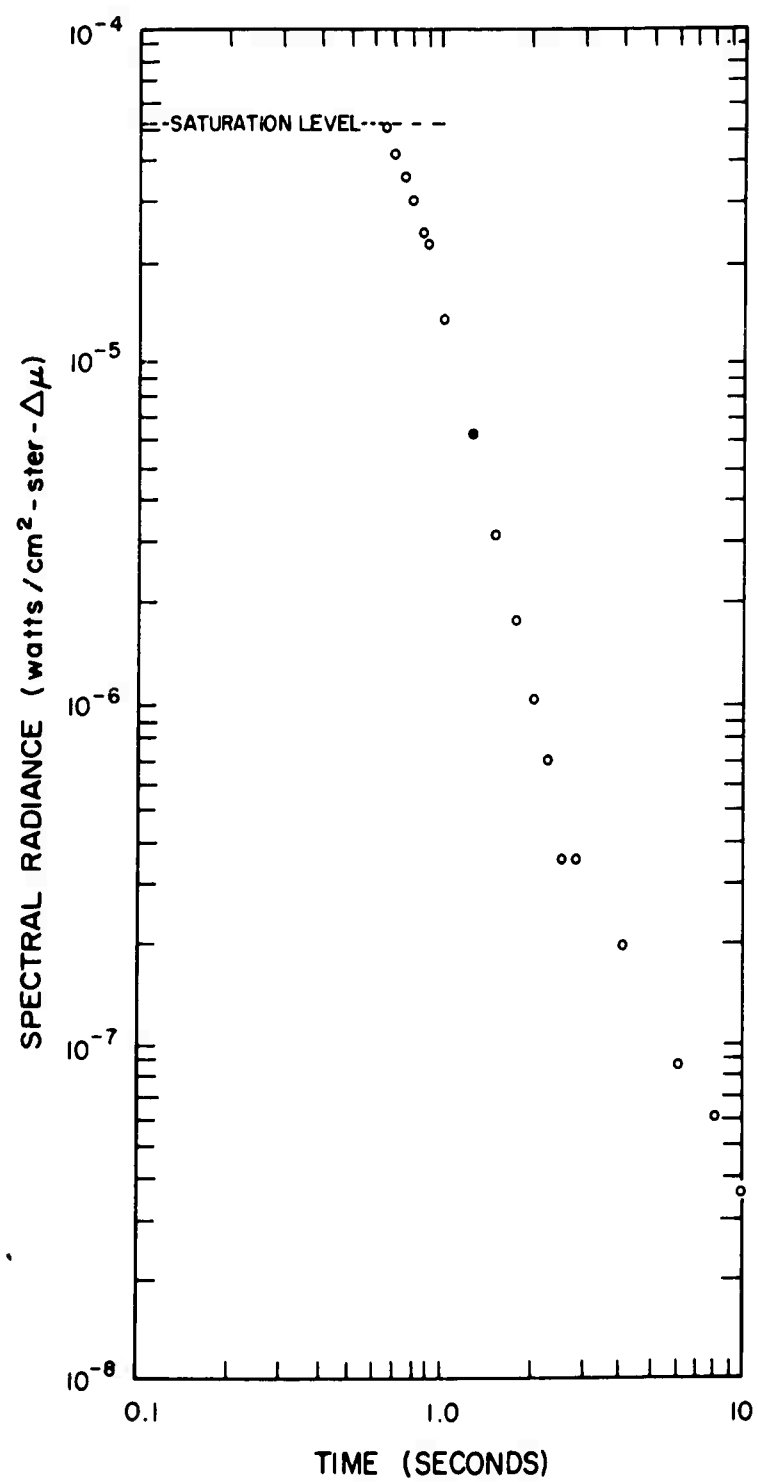


Figure 3.418 Spectral radiance, Kettle II, King Fish, Channel 18, early time.

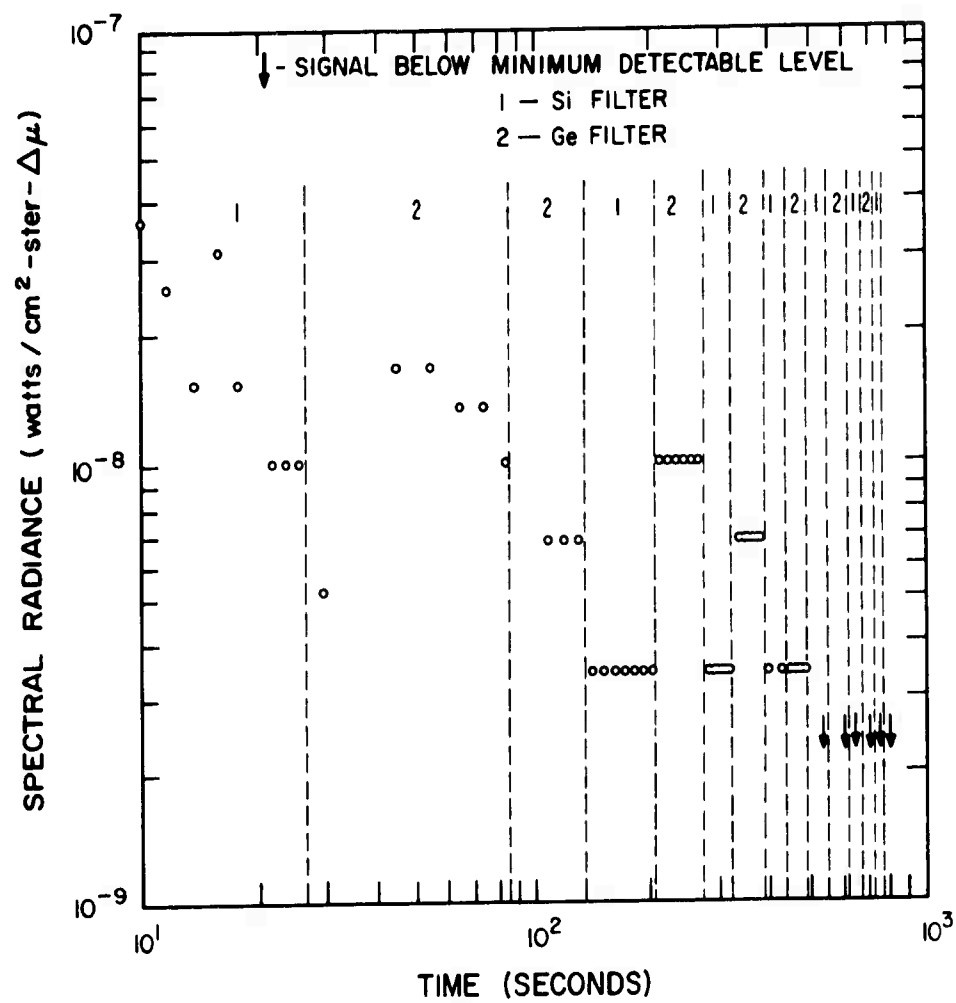


Figure 3.419 Spectral radiance, Kettle II, King Fish, Channel 18, late time.

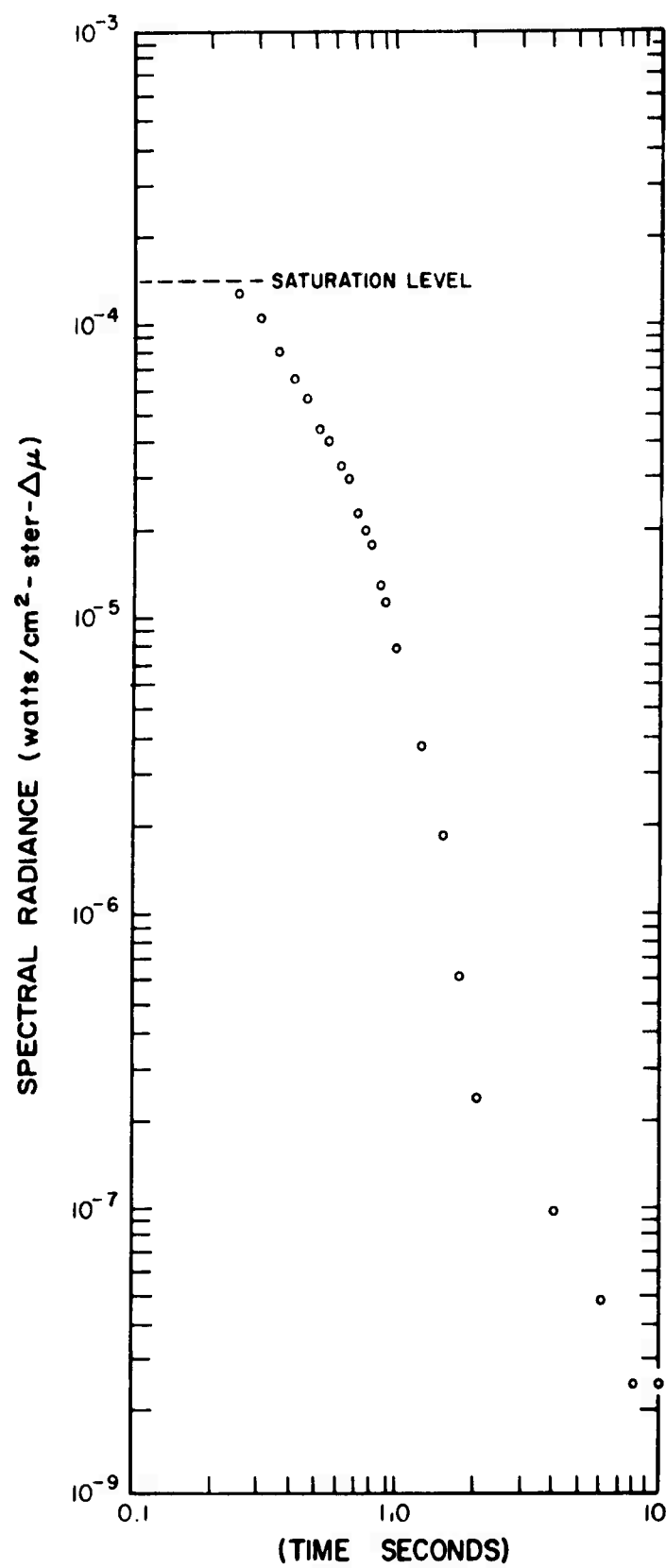


Figure 3.420 Spectral radiance, Kettle II, King Fish, Channel 19, early time.

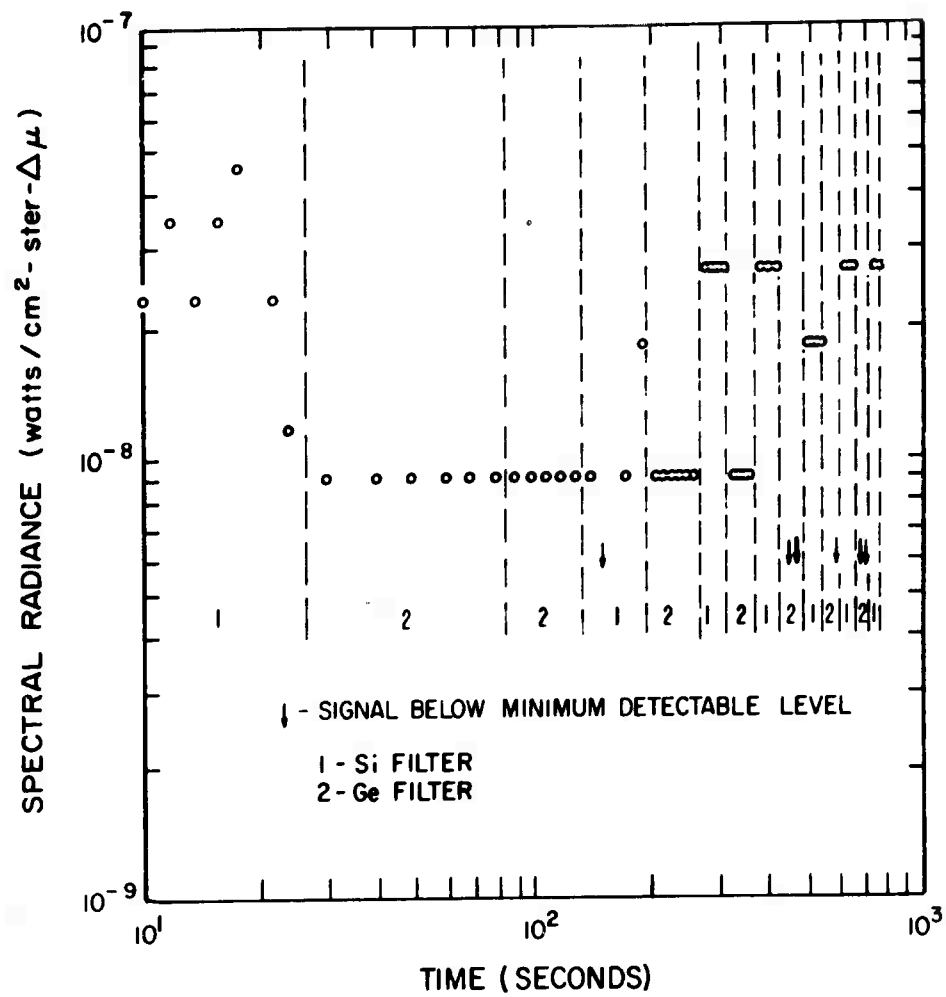


Figure 3.421 Spectral radiance, Kettle II, King Fish, Channel 19, late time.

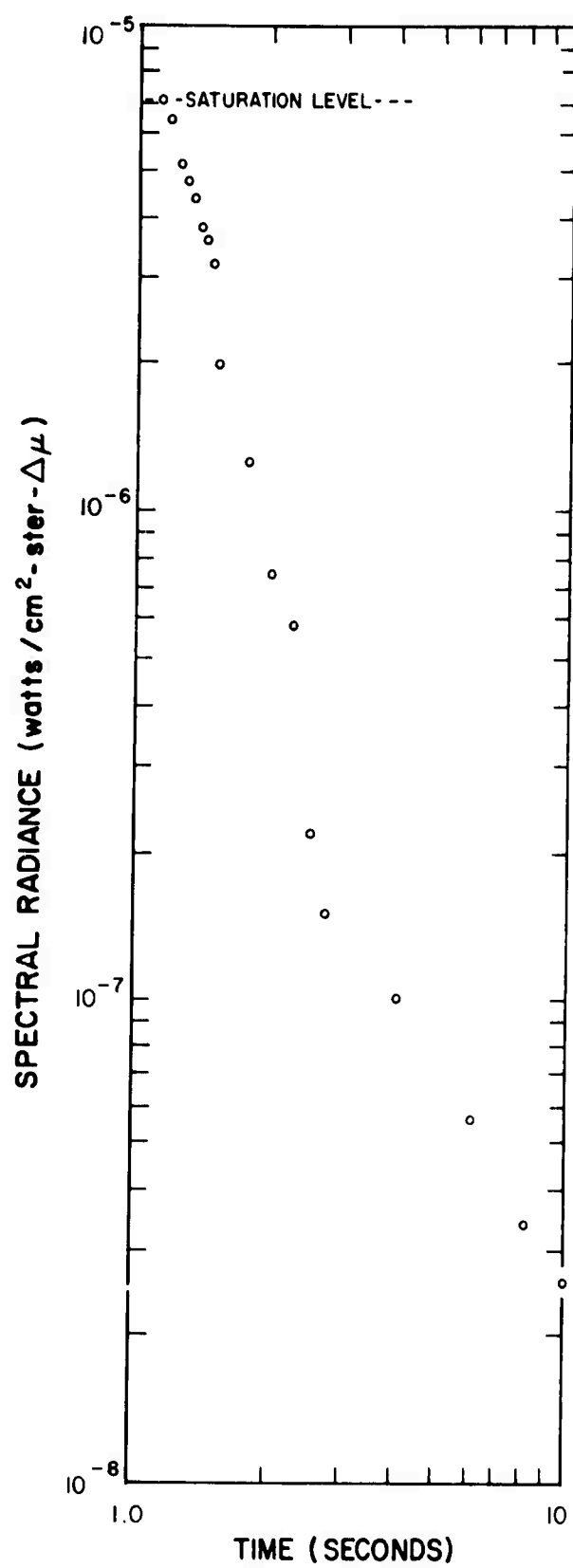


Figure 3.422 Spectral radiance, Kettle II, King Fish, Channel 20, early time.

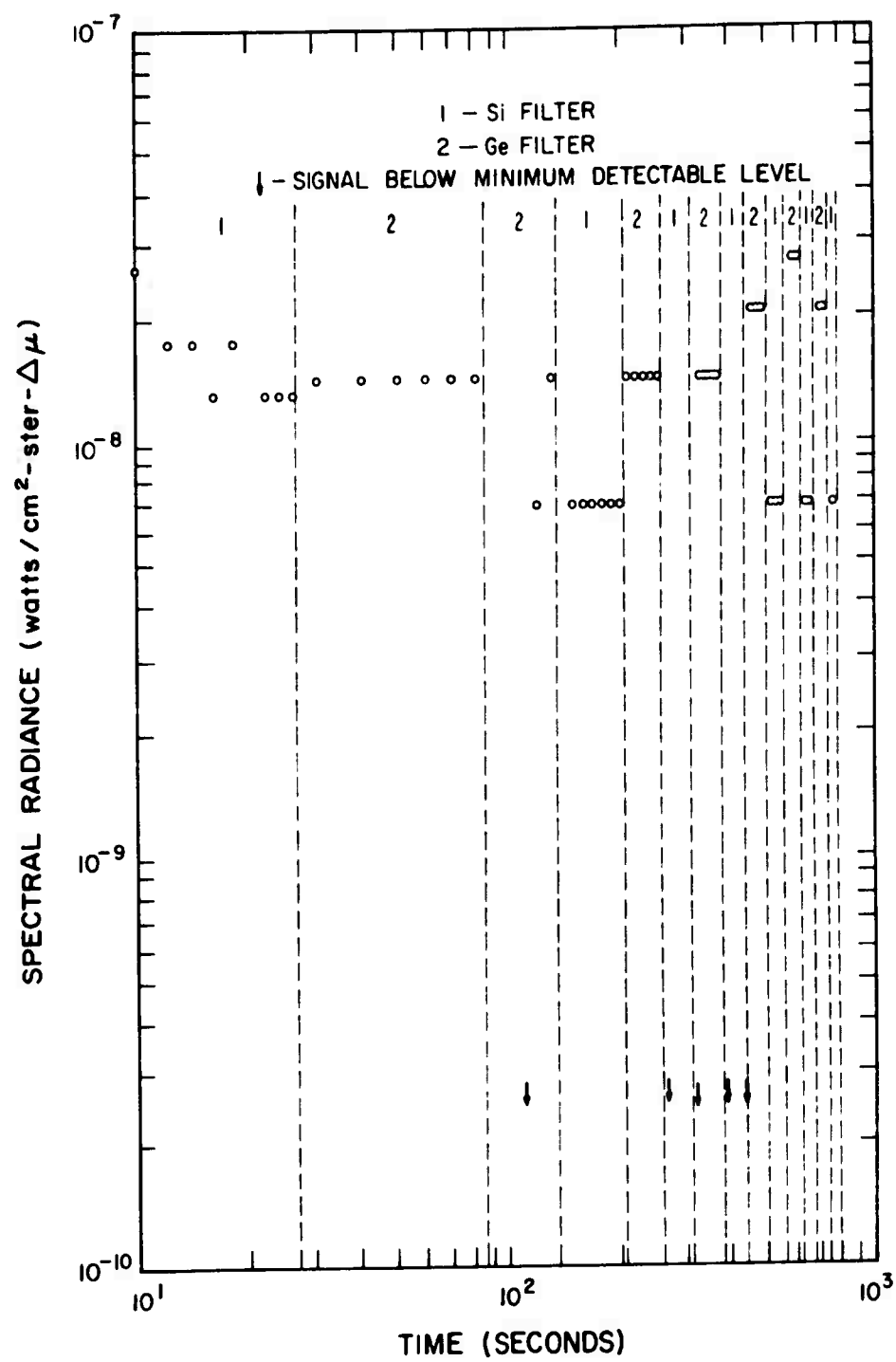


Figure 3.423 Spectral radiance, Kettle II, King Fish, Channel 20, late time.

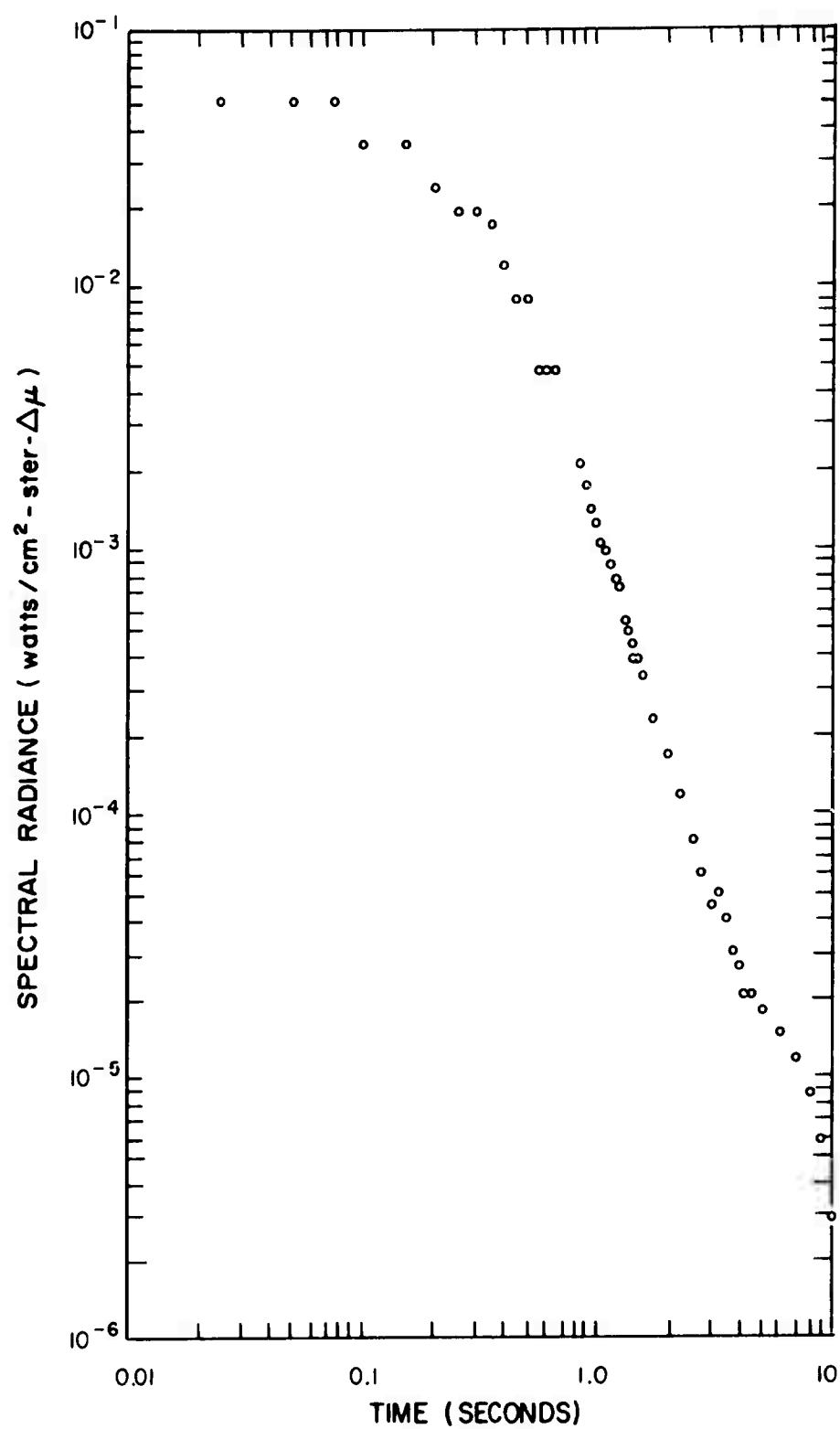


Figure 3.424 Spectral radiance, Kettle II, King Fish, Channel 21, early time.

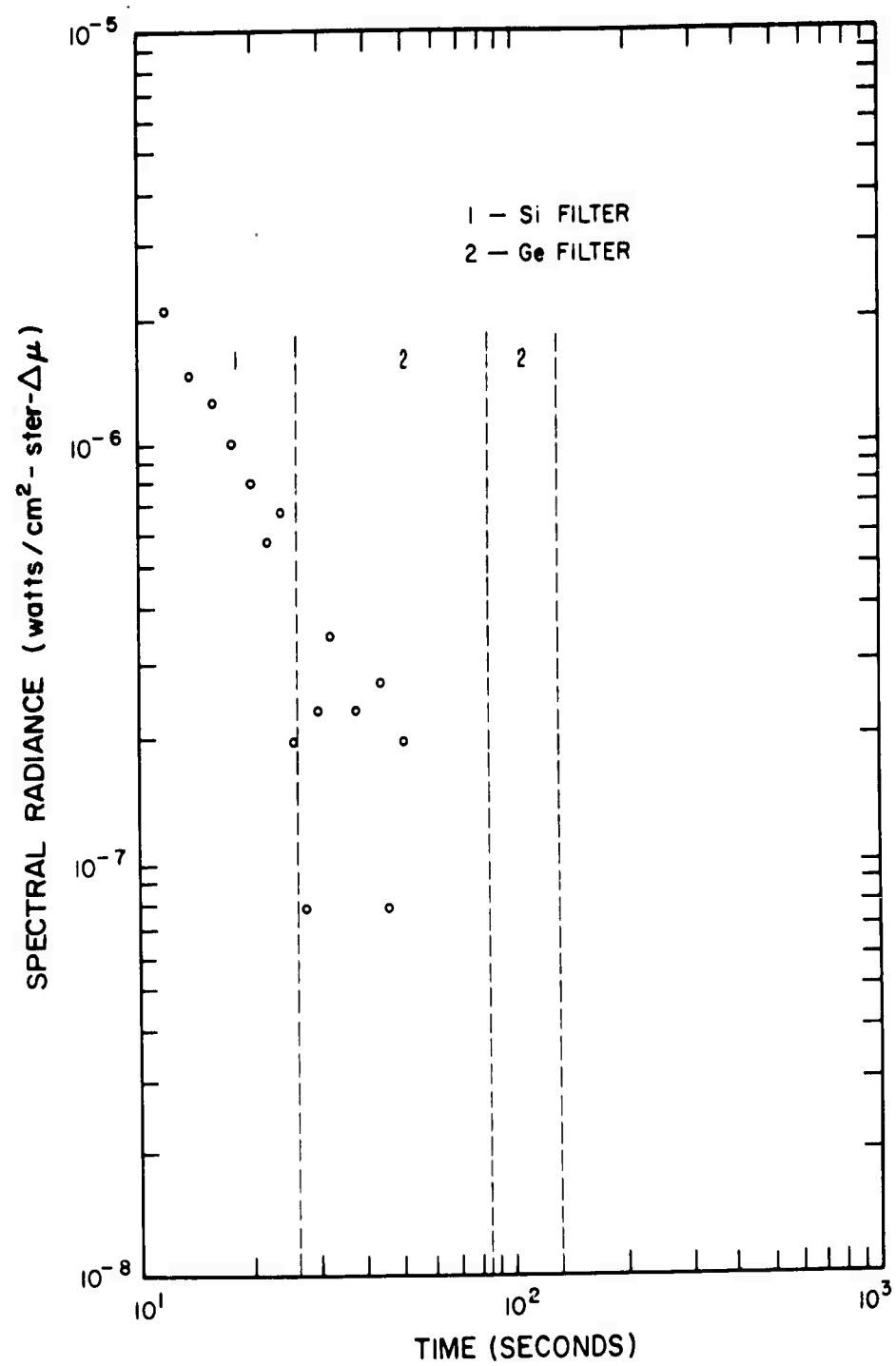


Figure 3.425 Spectral radiance, Kettle II, King Fish, Channel 21, late time.

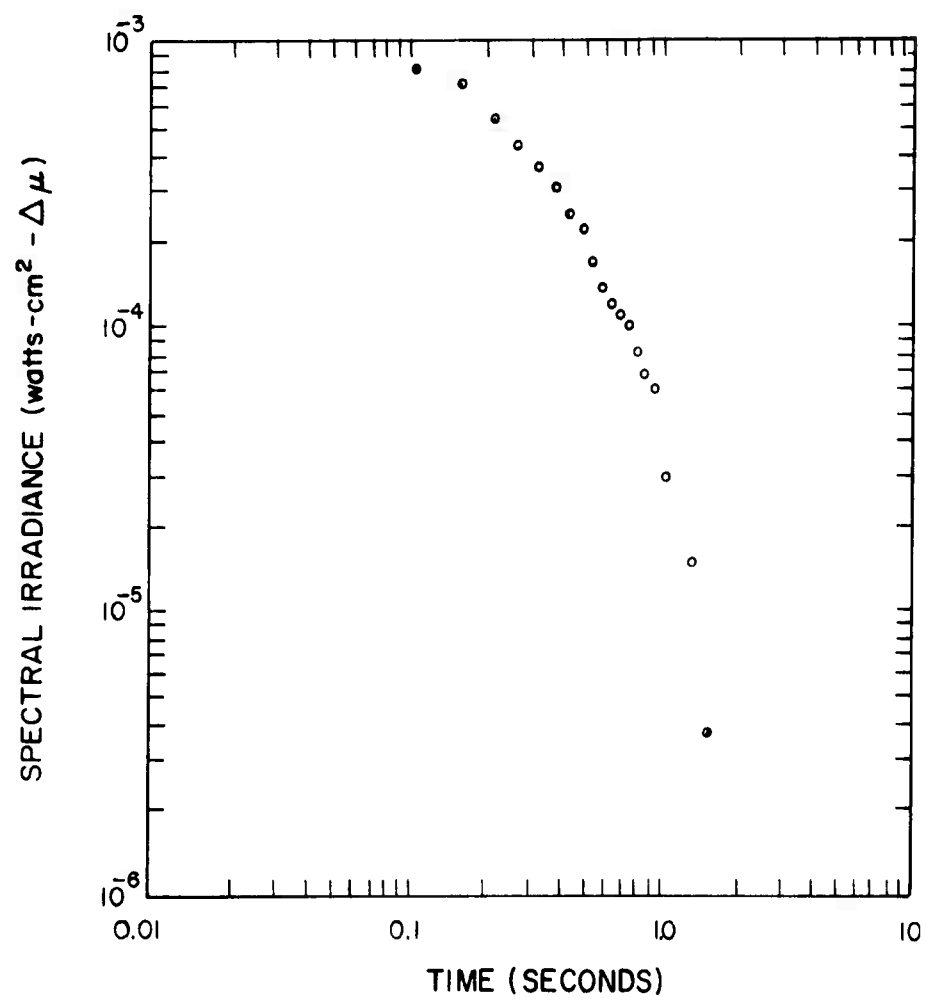


Figure 3.426 Spectral radiance, Kettle II, King Fish, Channel 22.

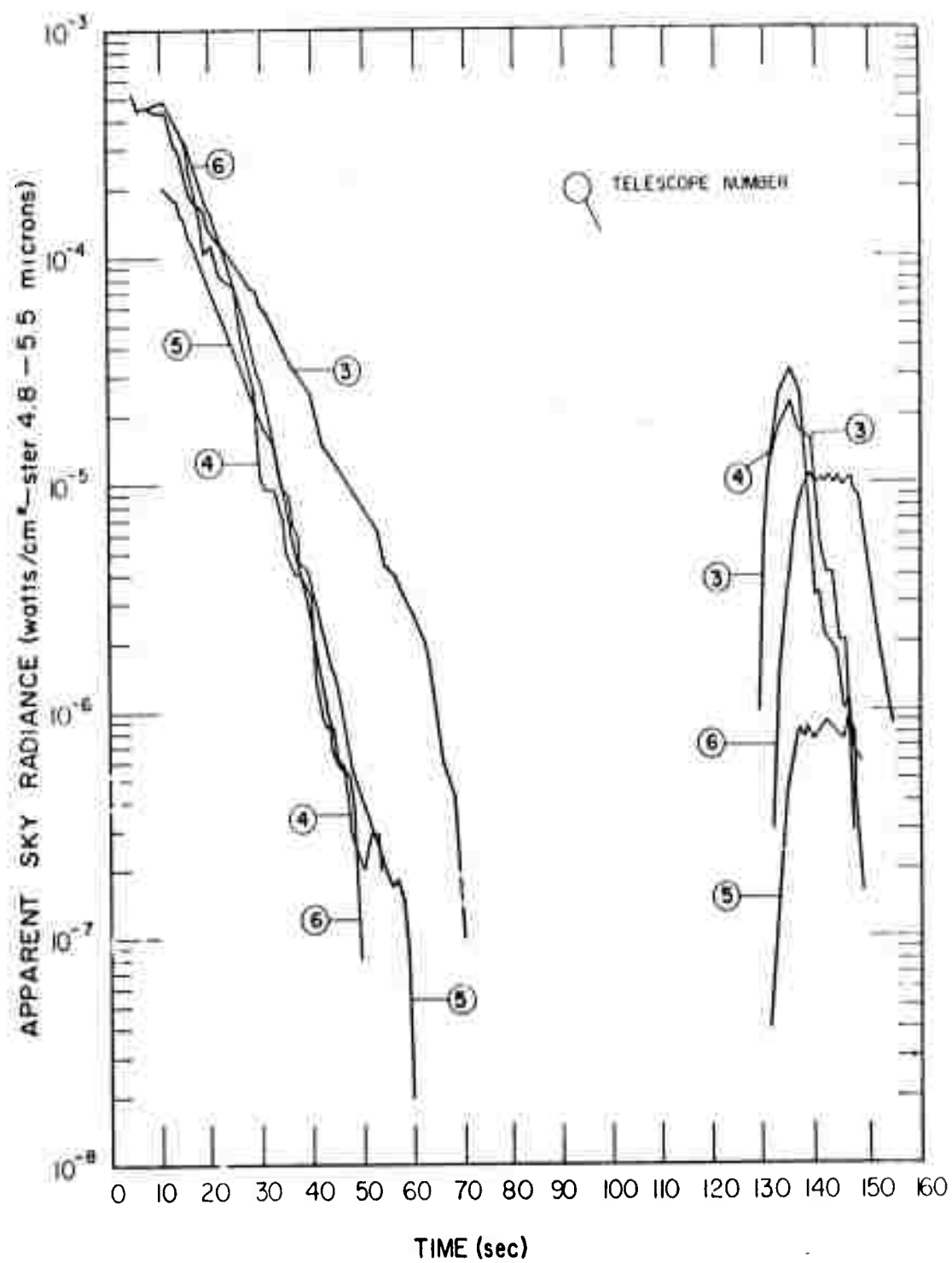


Figure 3.427 0.5-micron data, King Fish.

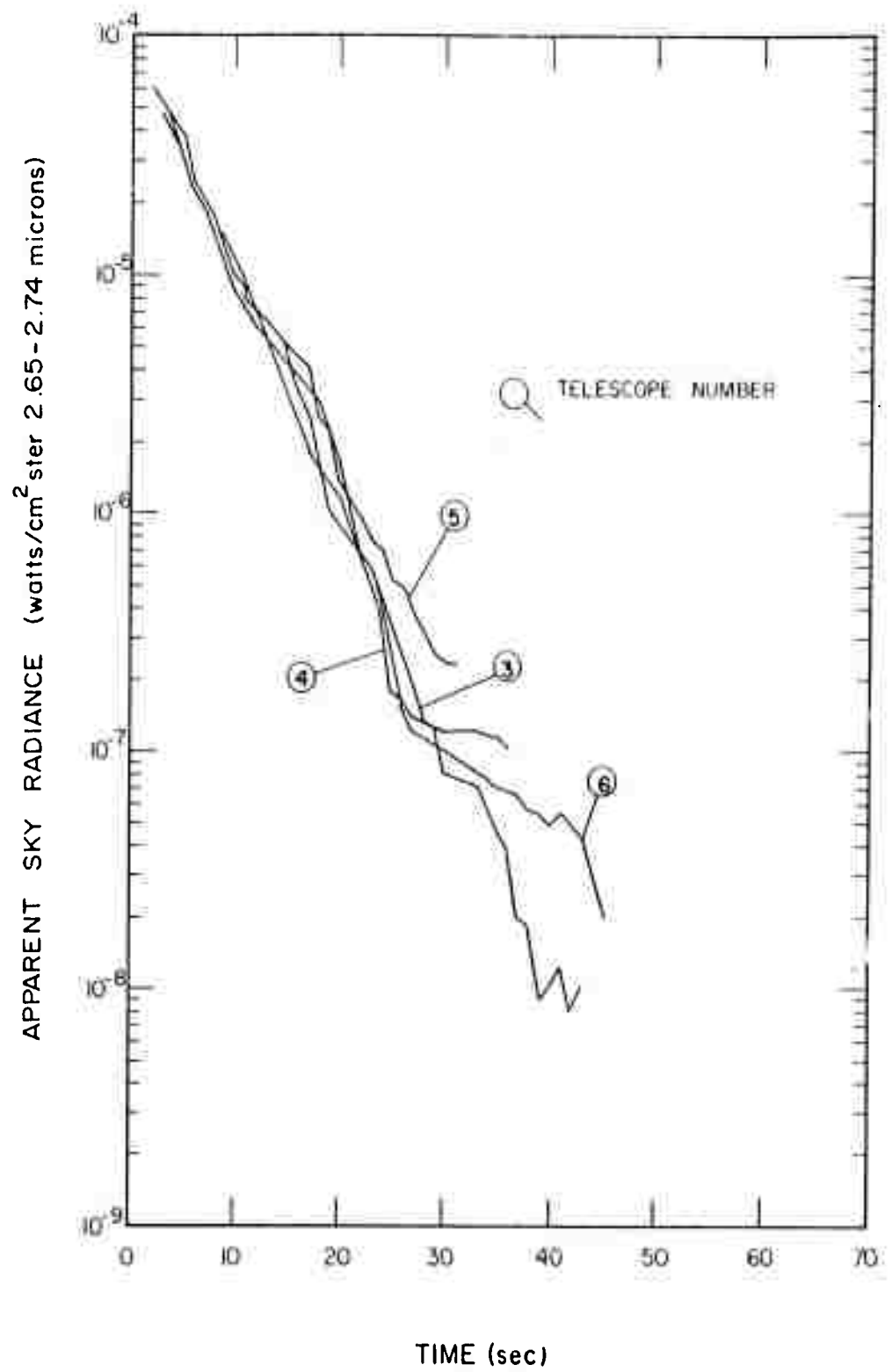


Figure 3.428 2.7-micron data, King Fish.

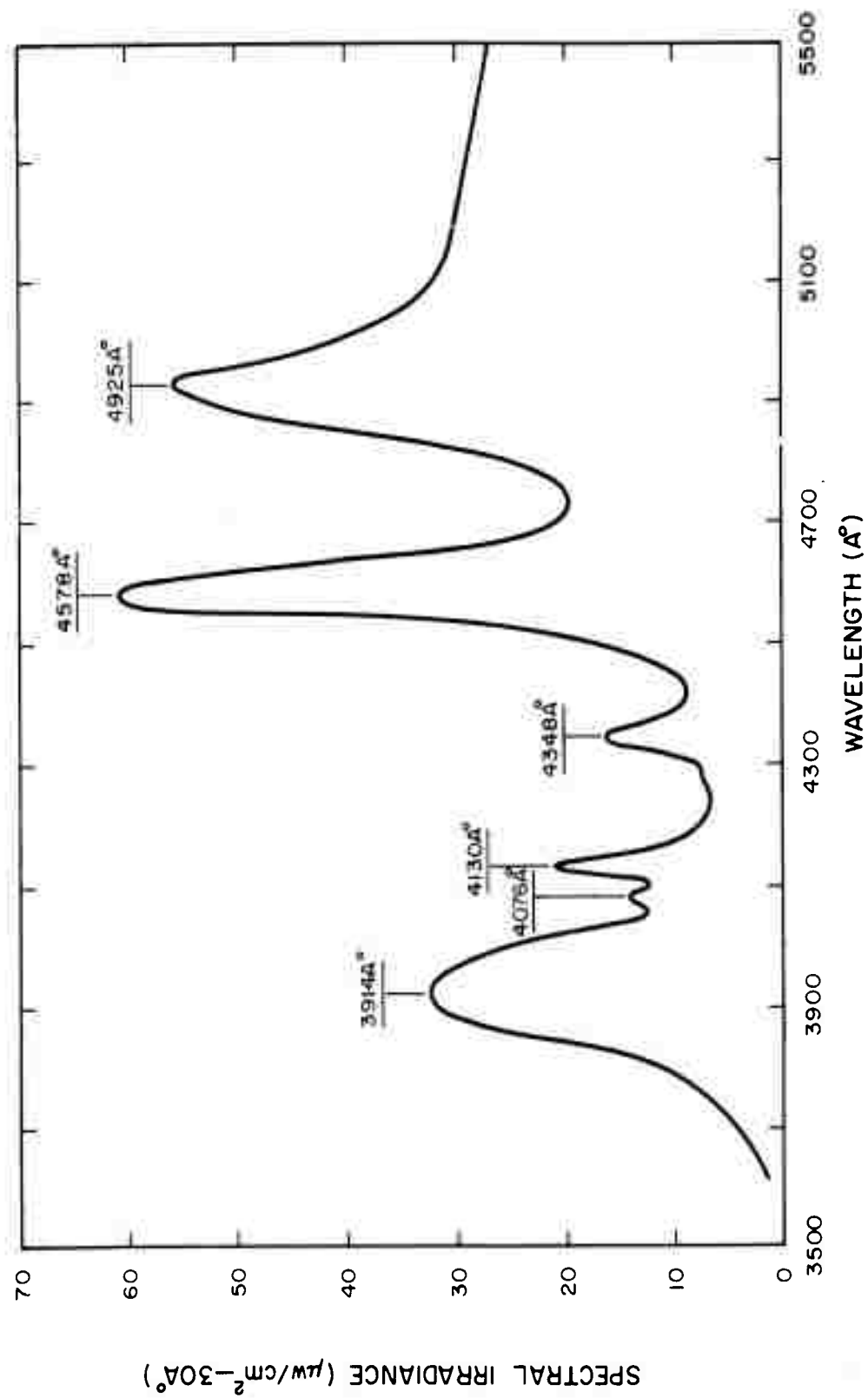


Figure 3.429 Spectrogram at H + 15 msec, Kettle I, Kin Fish.

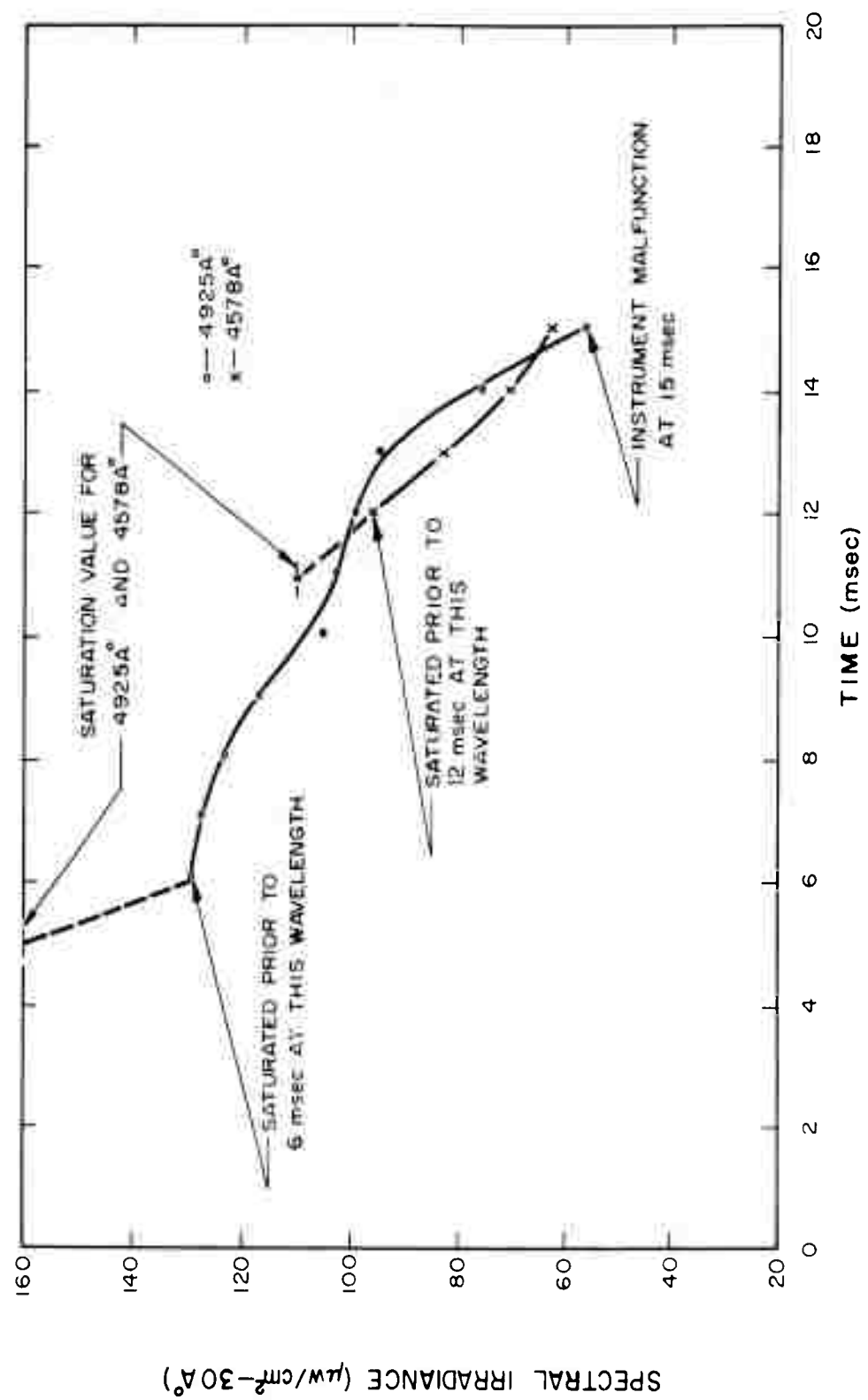


Figure 3.430 Intensity decay at 4,578 and 4,925 Angstroms, Kettle I, King Fish.

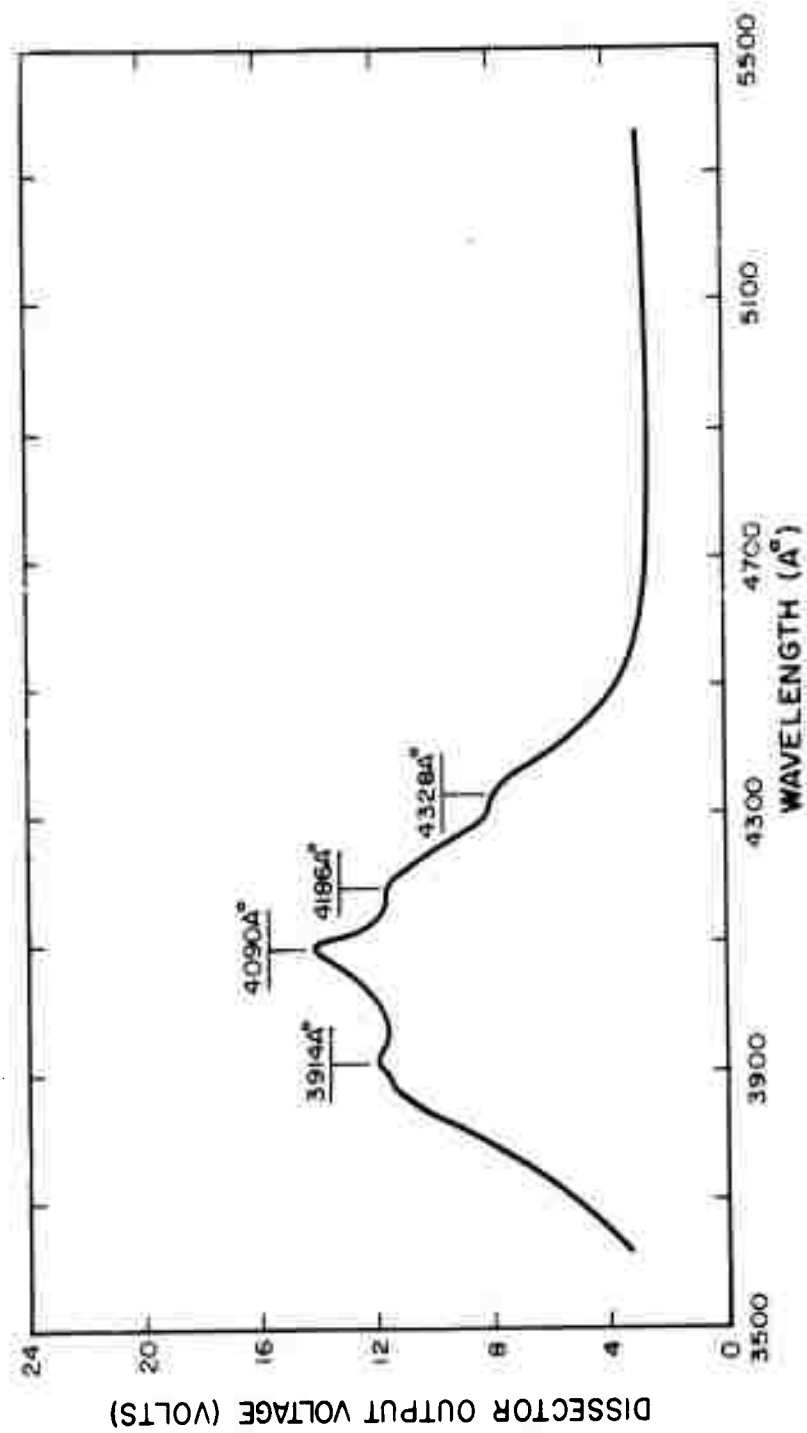


Figure 3.431 Spectrogram at H + 100 msec, Kettle I, King Fish.

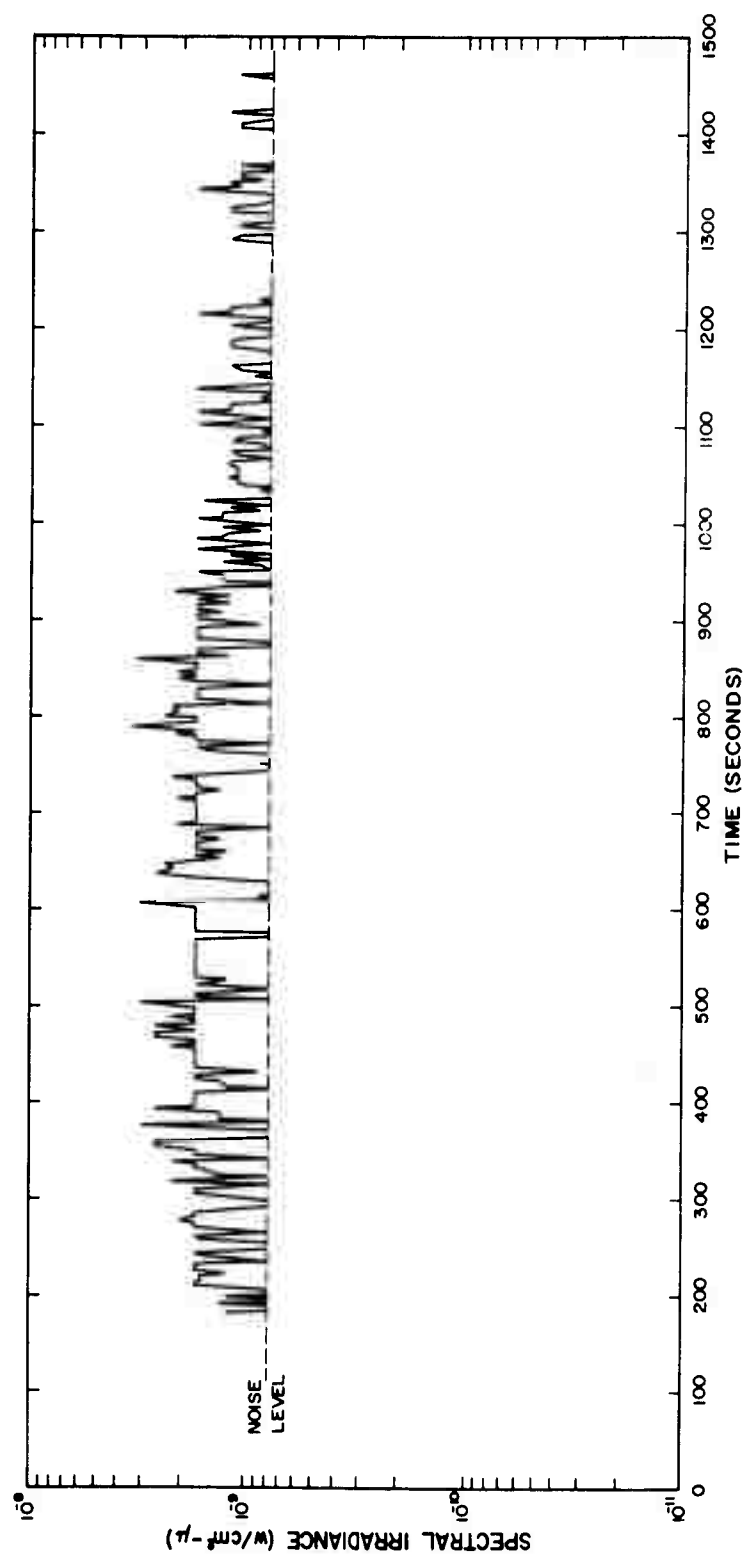


Figure 3.432 Irradiance, Kettle I, King Fish, in region 1.55 to 1.615 μ .

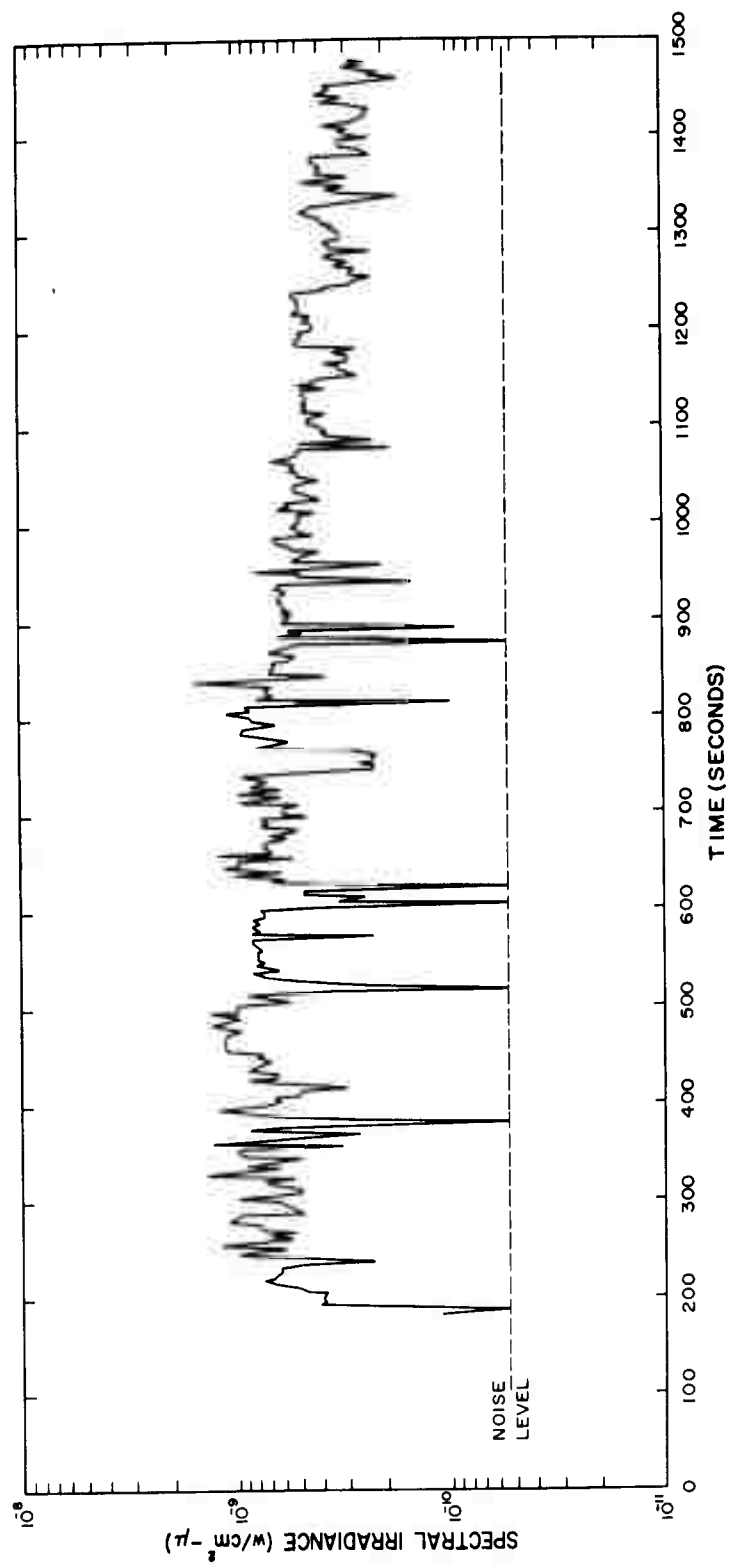


Figure 3.433 Irradiance, Kettle I, King Fish, in region
1.62 to 1.93 μ .

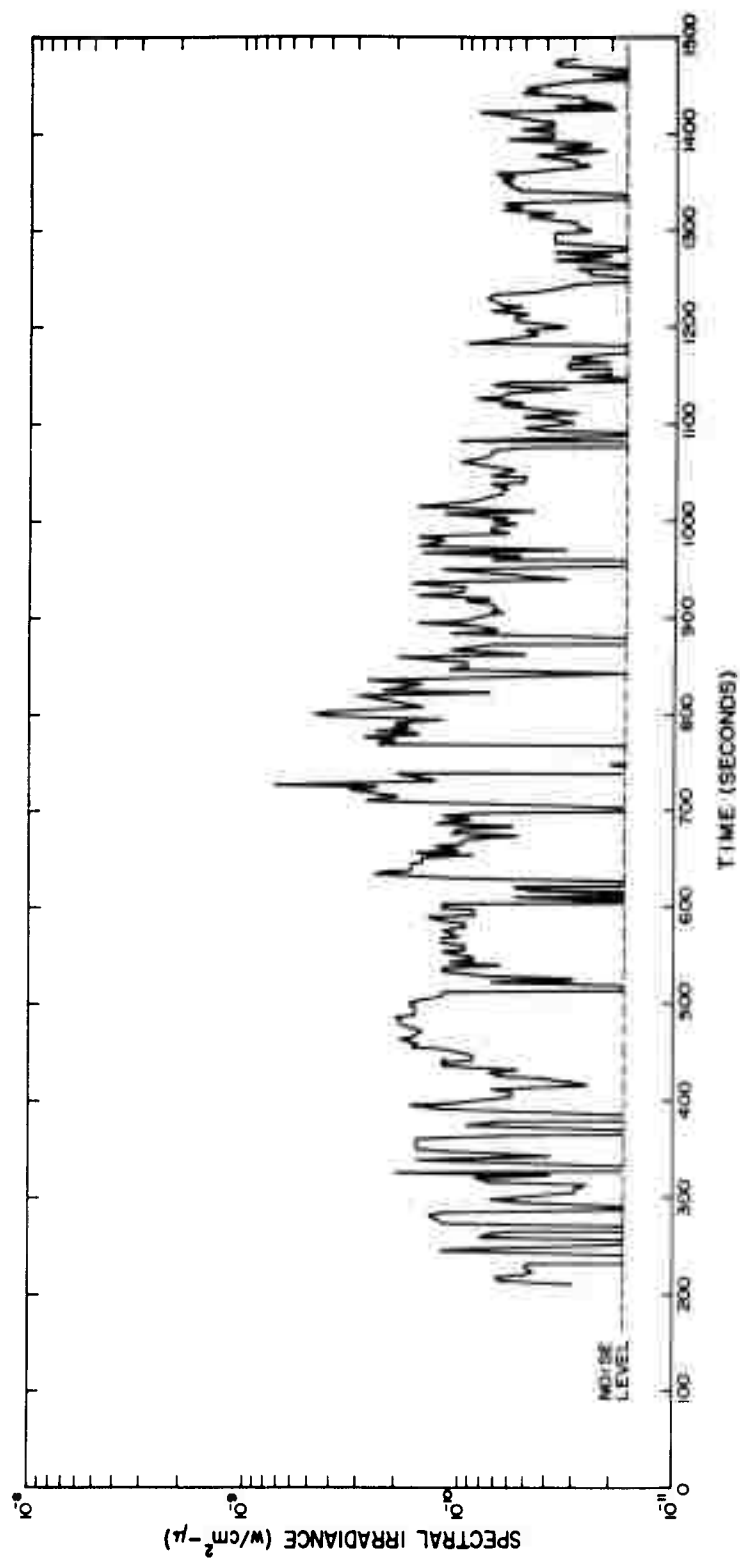


Figure 3.434 Irradiance, Kettle I, King Fish, in region 1.87 to 2.56 μ .

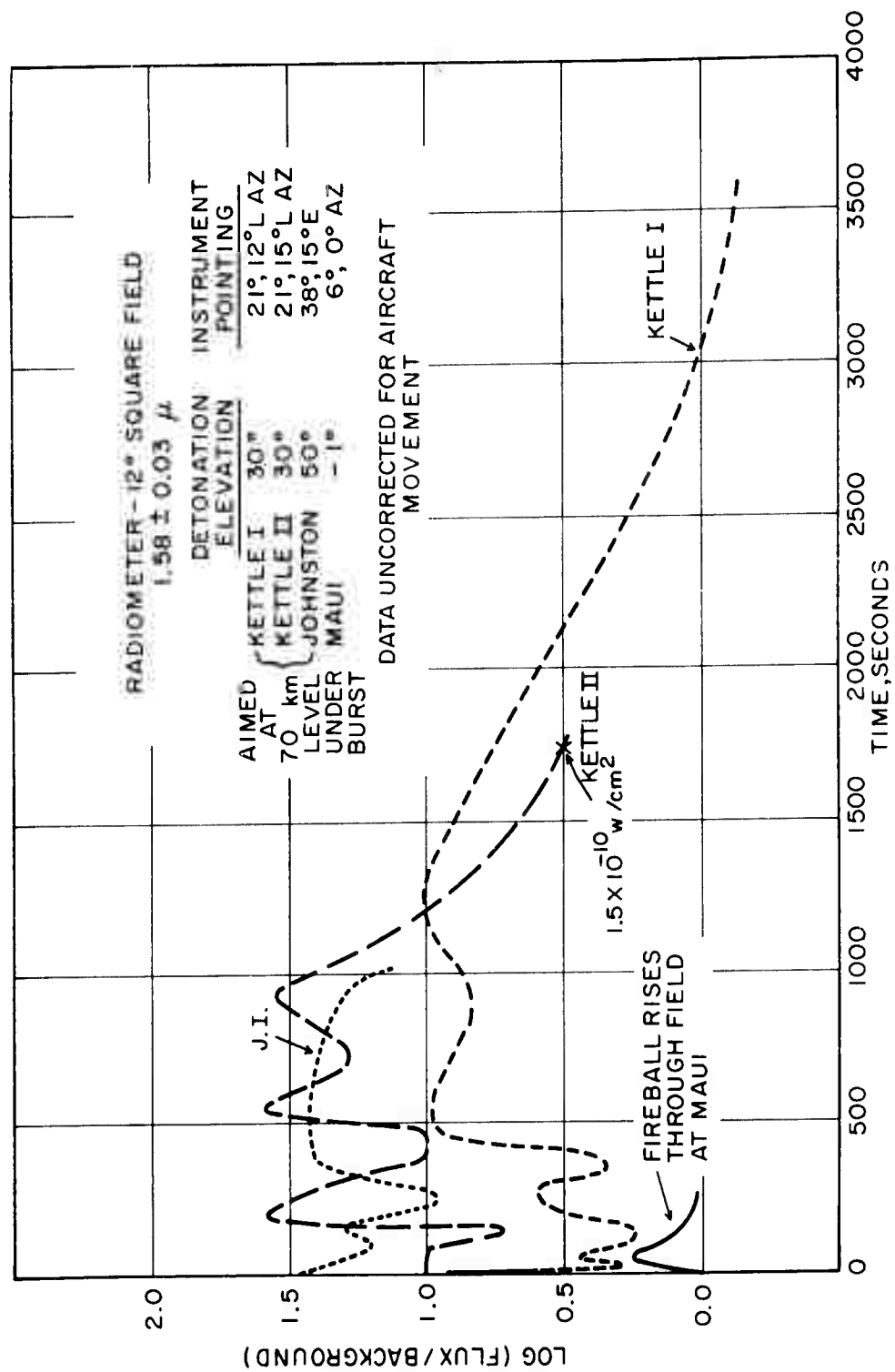


Figure 3.435 PbS radiometer results from all stations, King Fish.

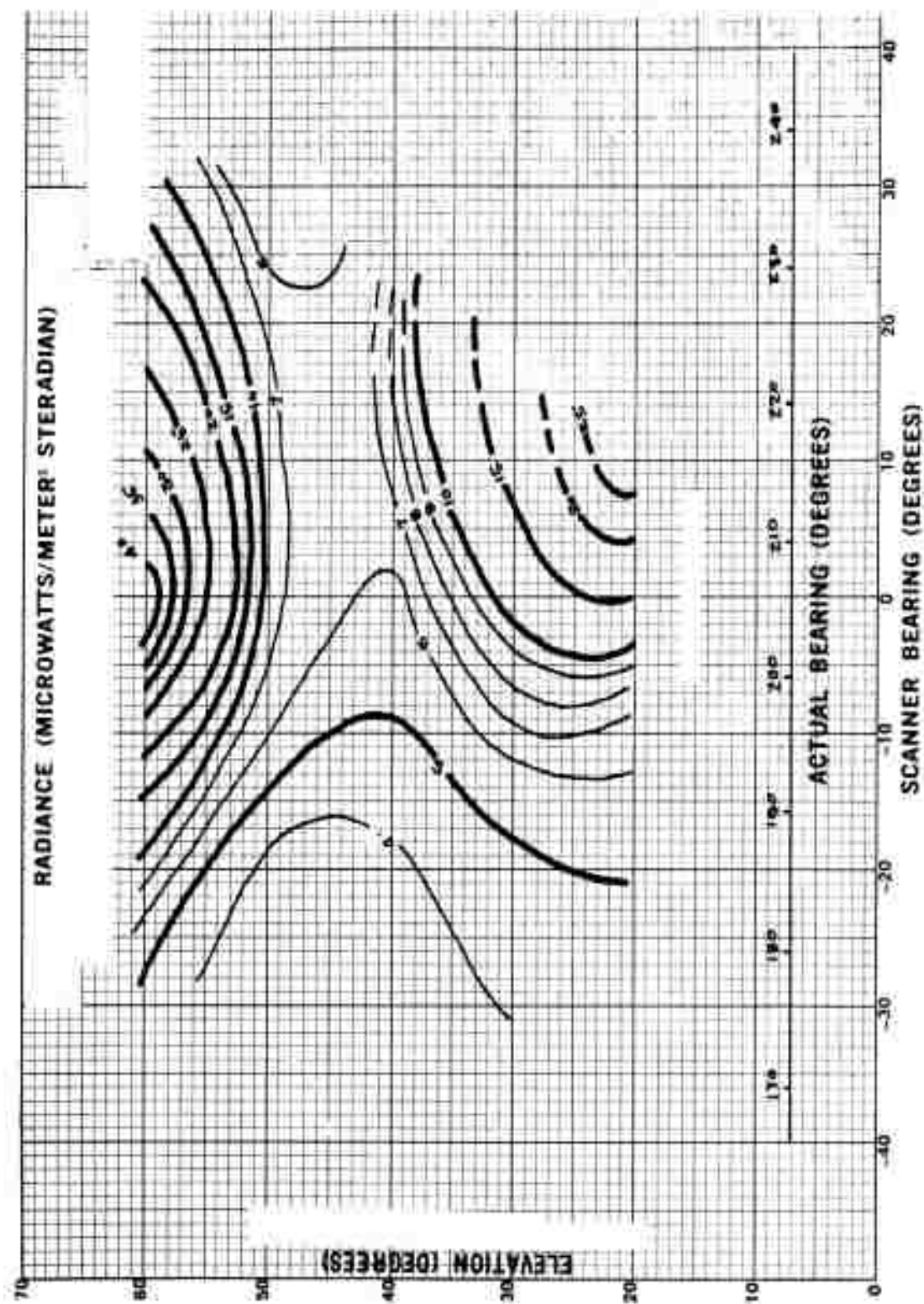


Figure 3.436 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H+176 sec.

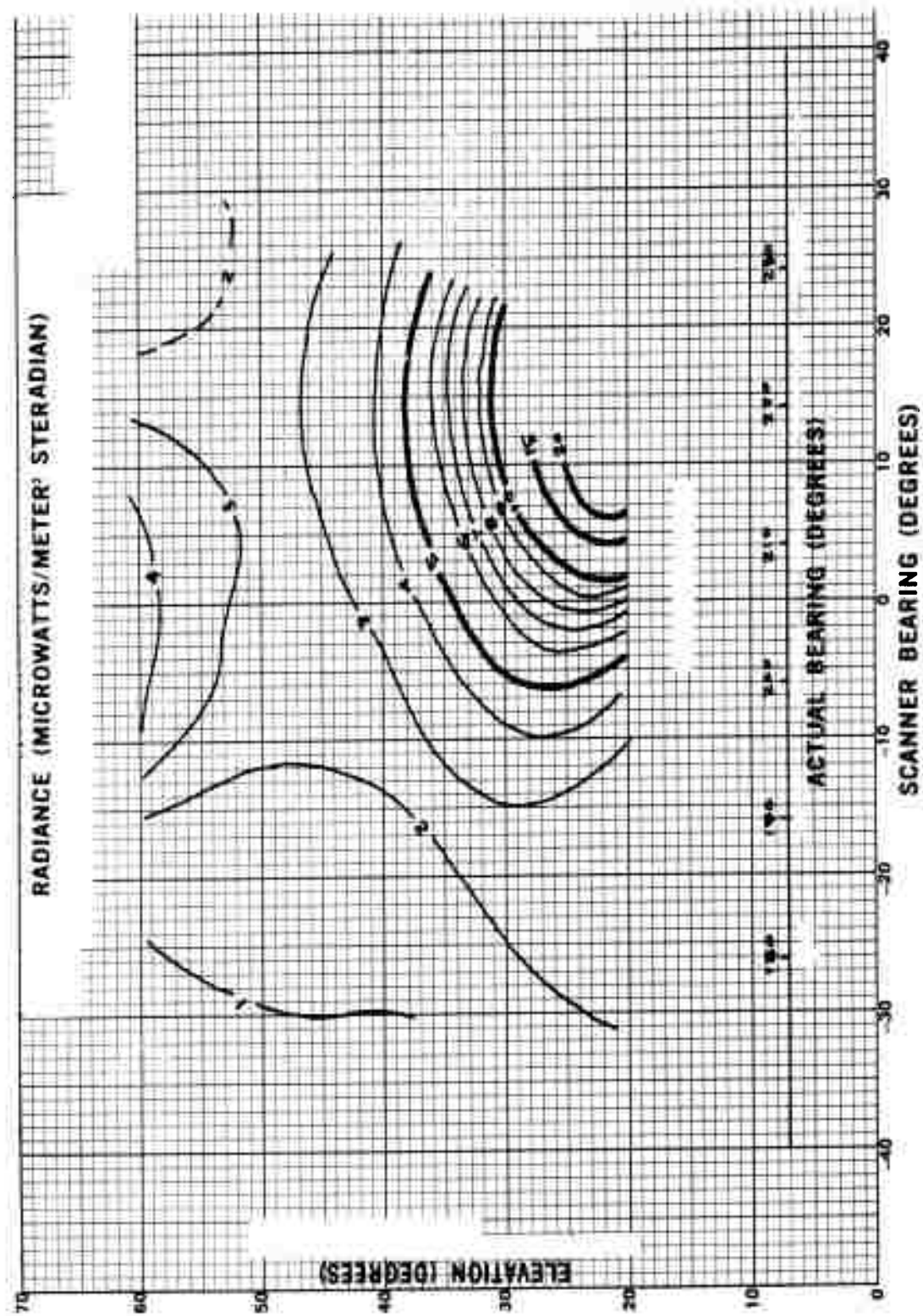


Figure 3.437 Sky radiance, Kettle I, King Fish, 0.373 to 0.396
microwatts/meter² steradian

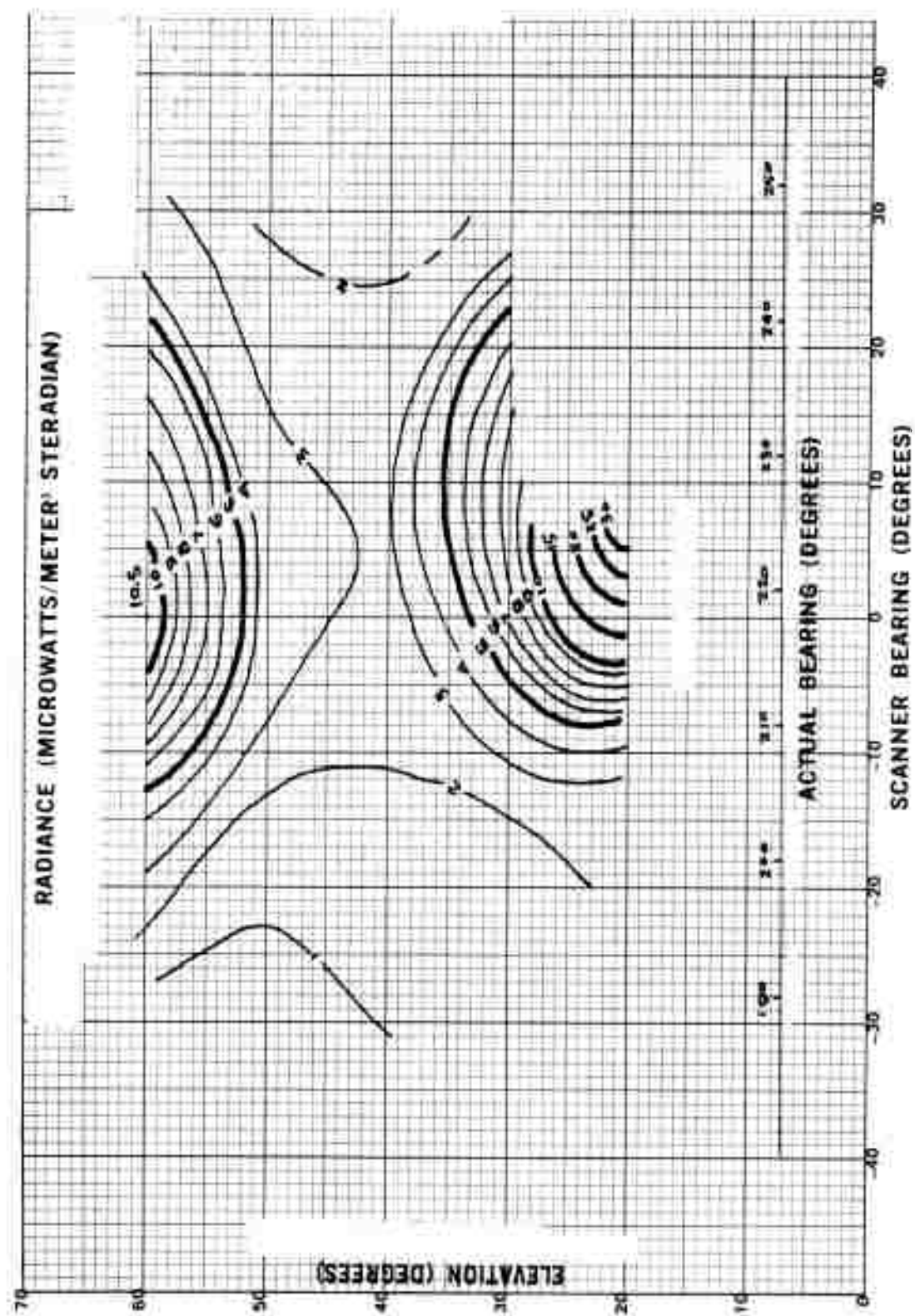


Figure 3.438 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 312 sec.

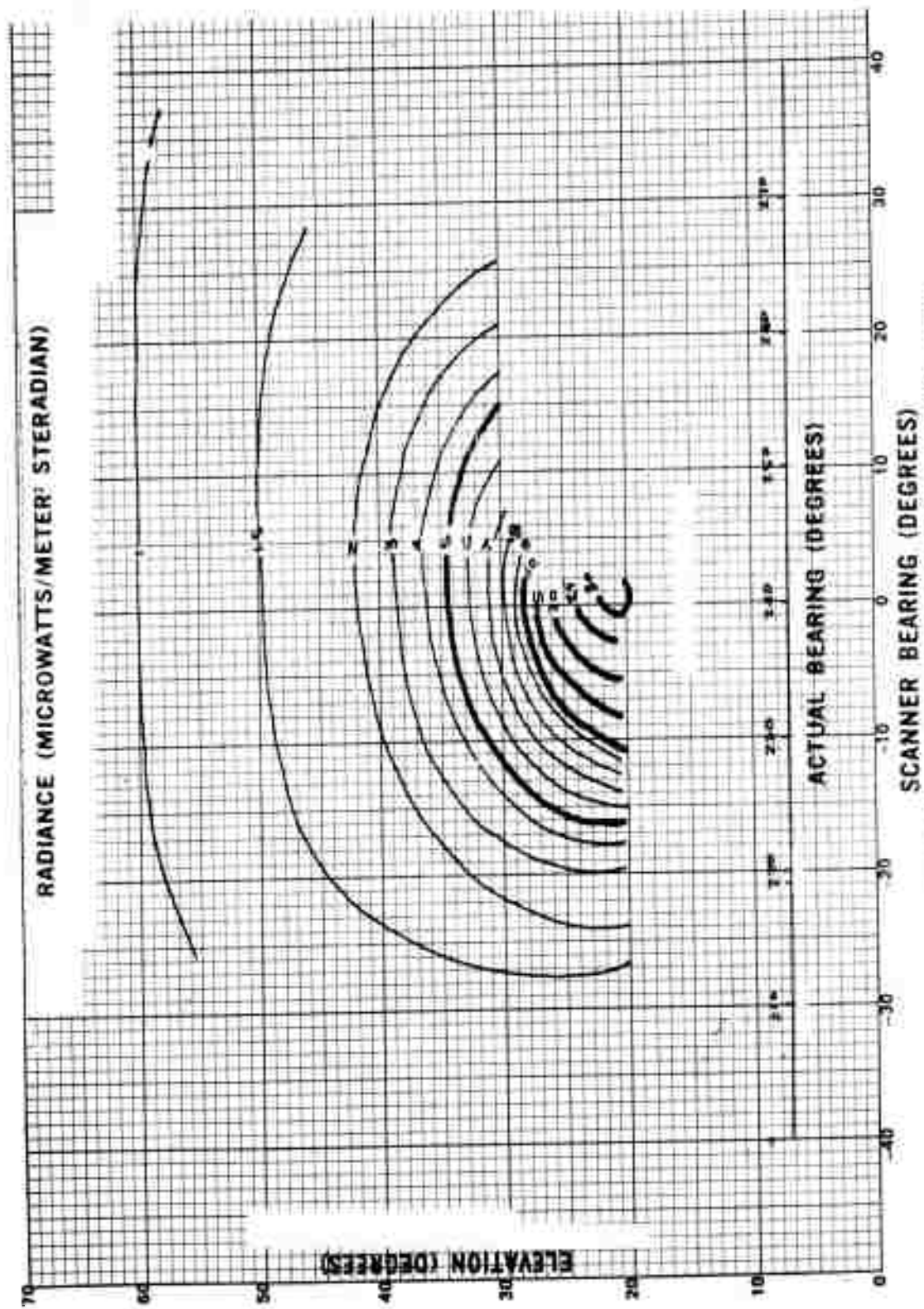


FIGURE 1.139. Sky Radiance, Kottlo 1, King Fish, 0.573 to 0.394
 (Jensen, 1971, p. 117, 118).

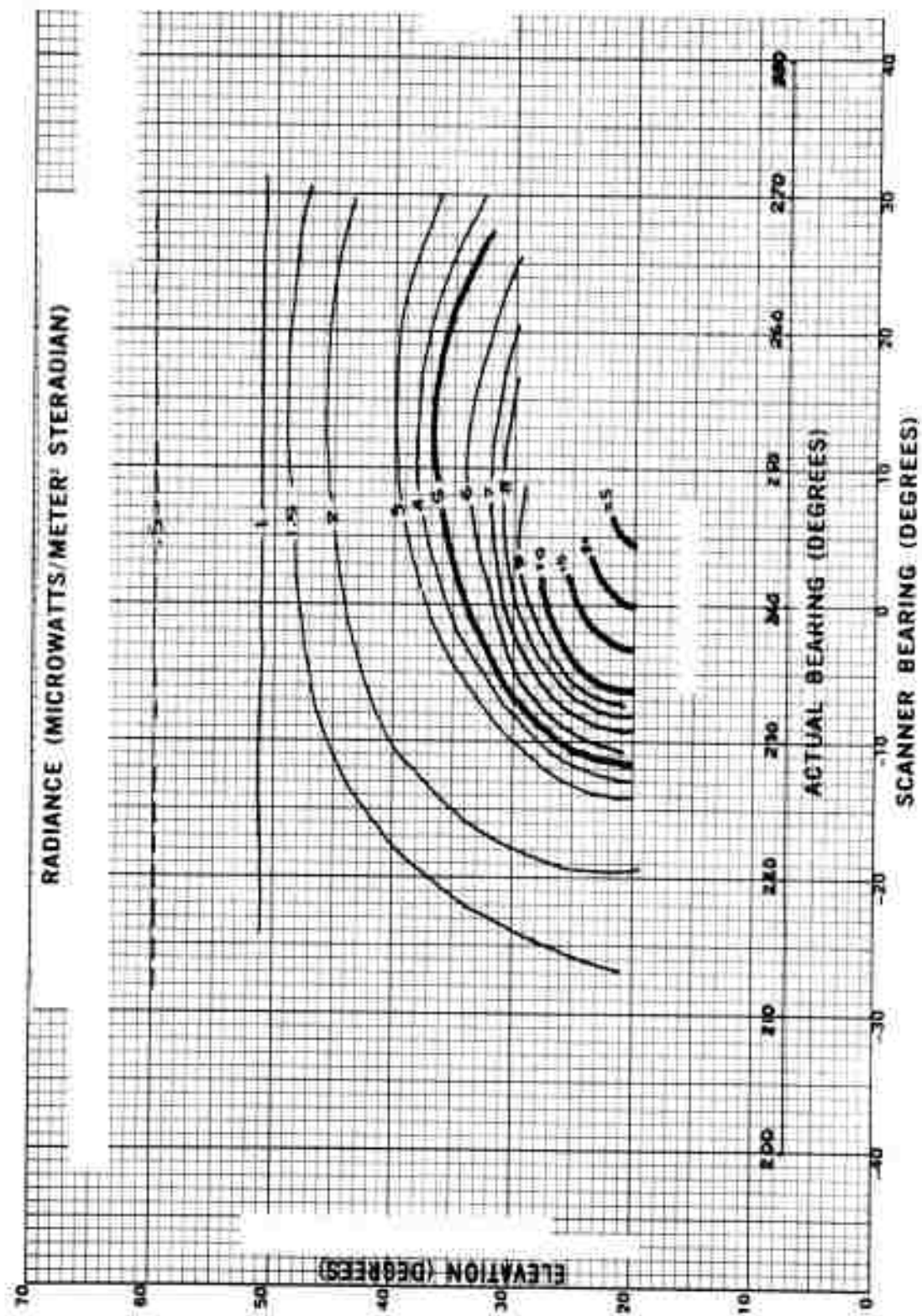


Figure 3.440 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 514 sec.

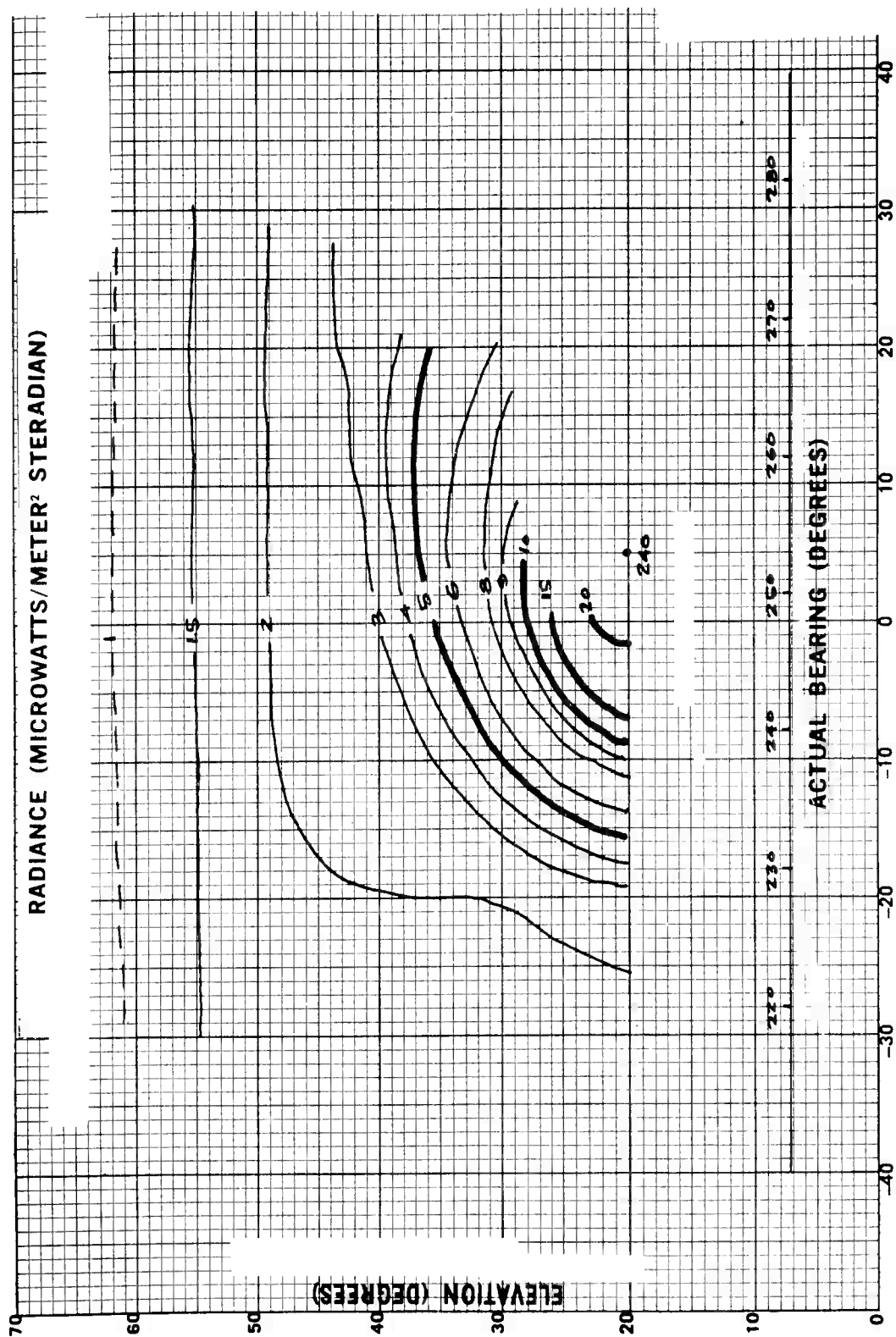


Figure 3.441 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, $H = 5.84$ sec

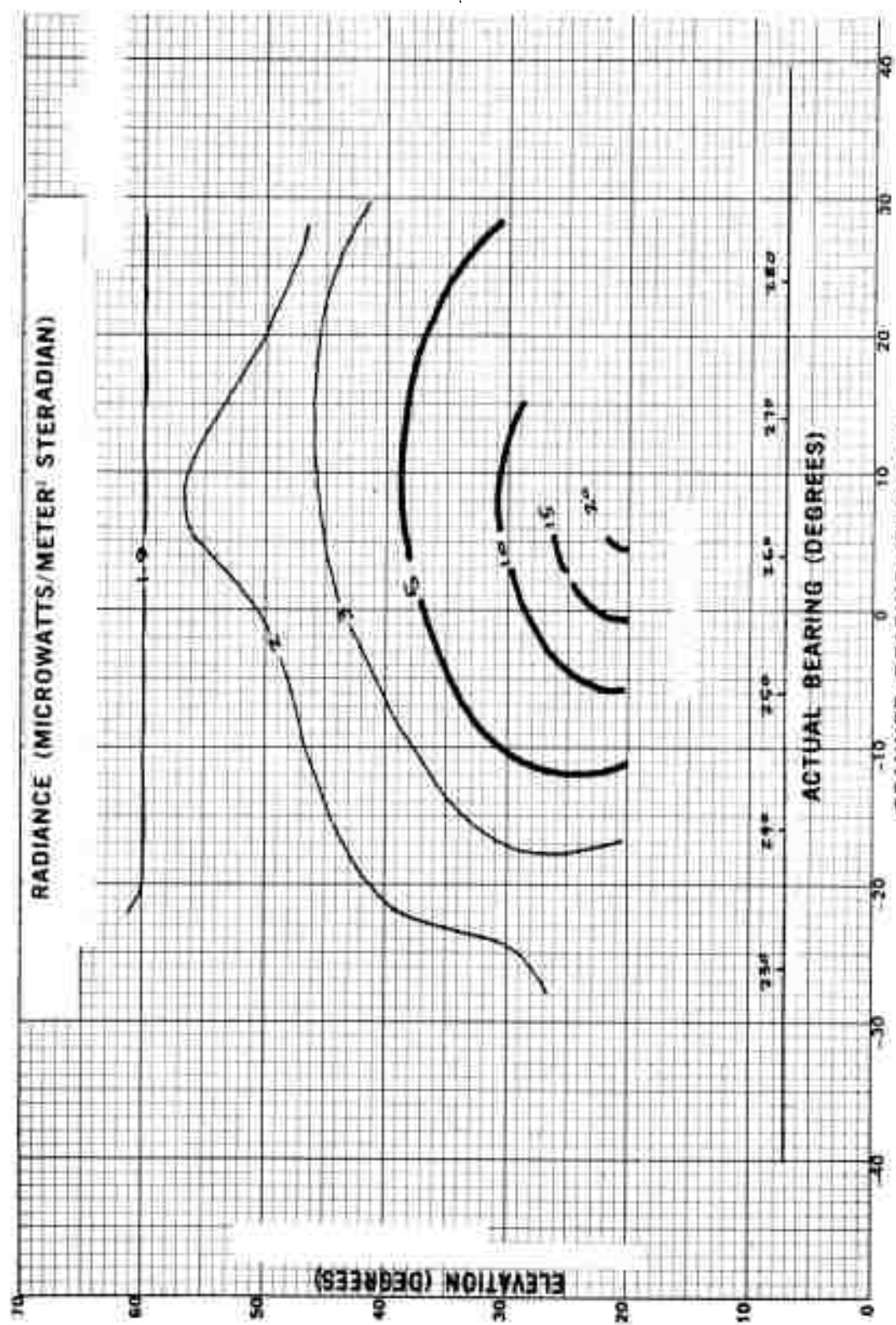
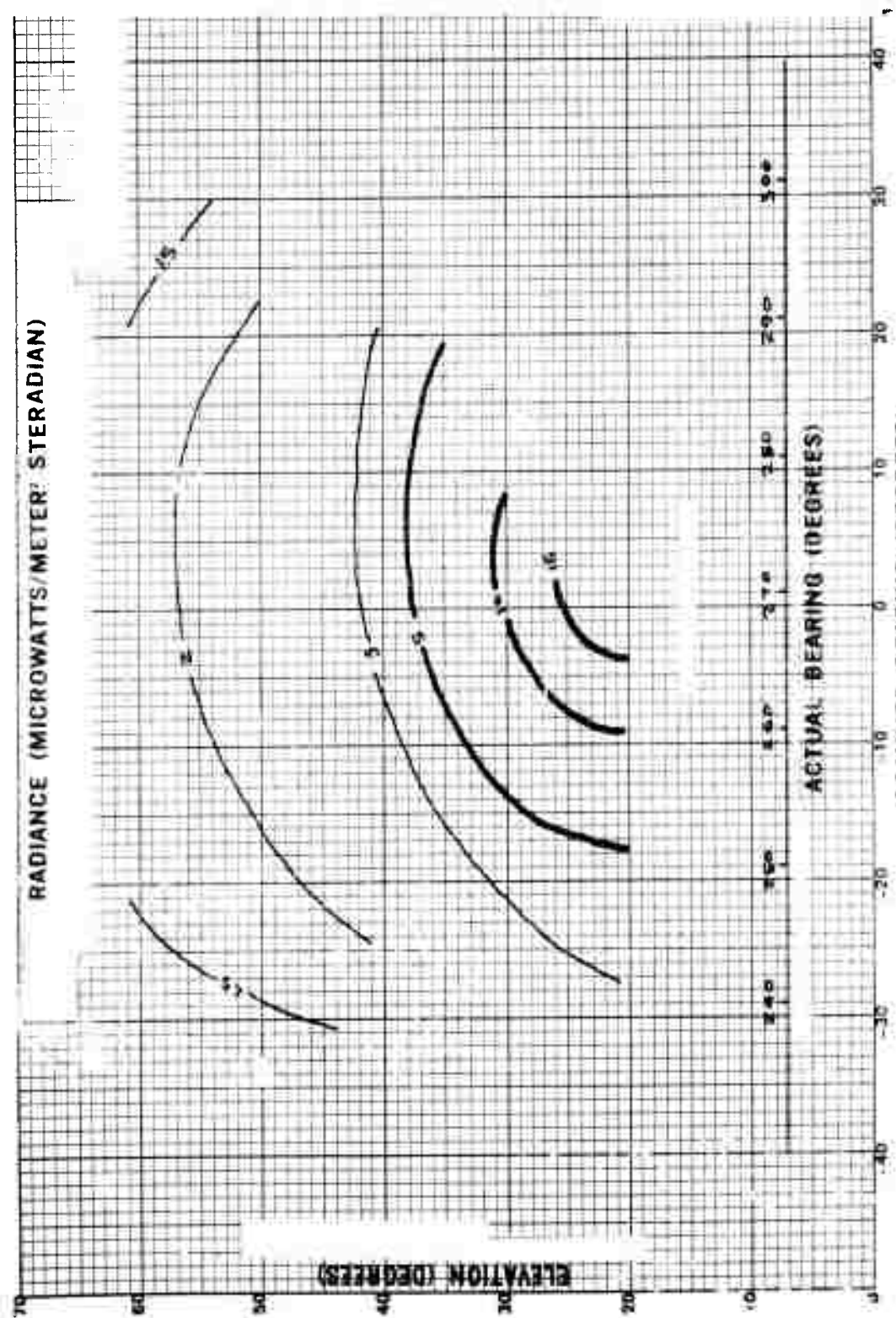


Figure 3.442 Sky radiance, Kettle I, King Fish, 0.373 to 0.398 microns, H = 717 feet.



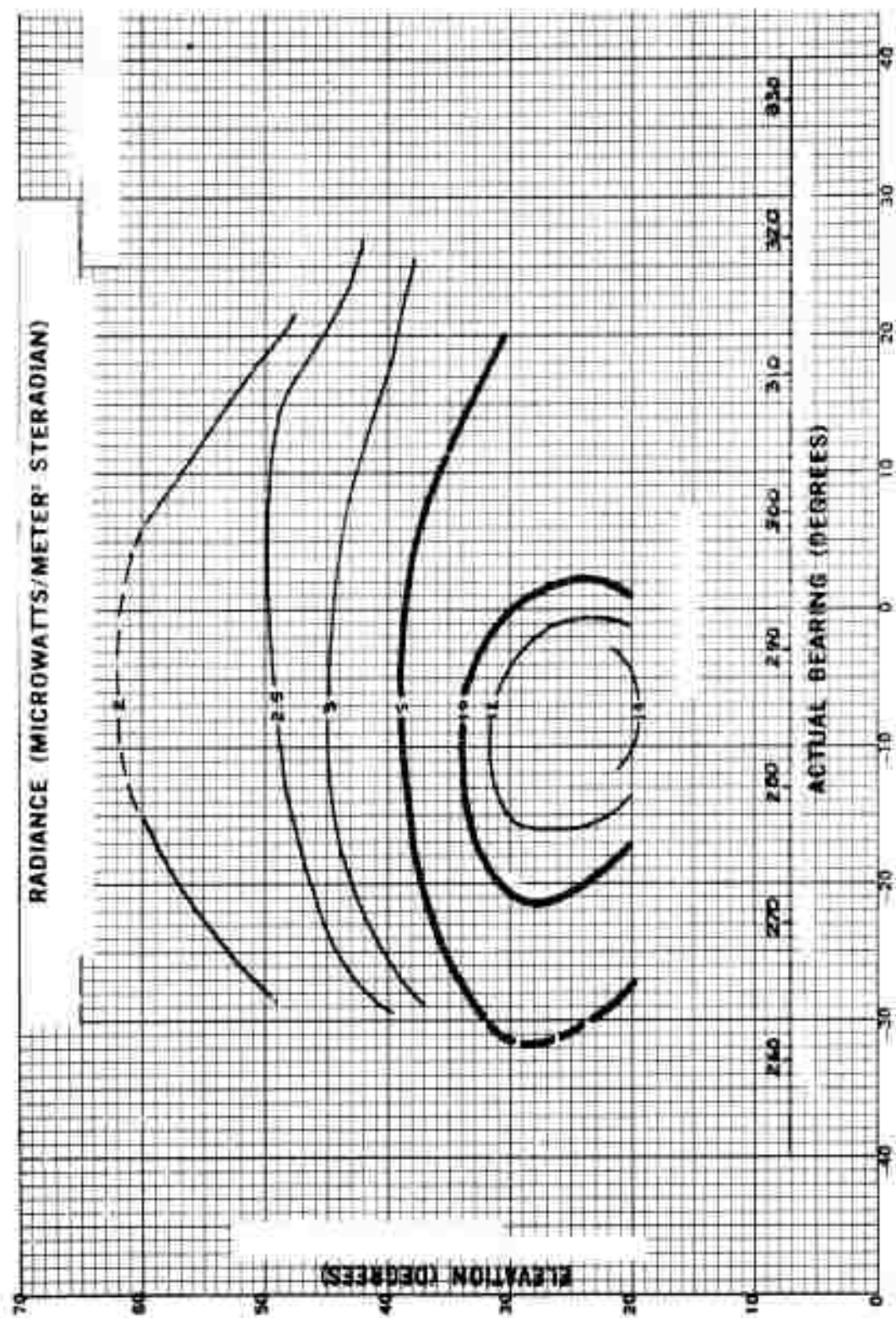
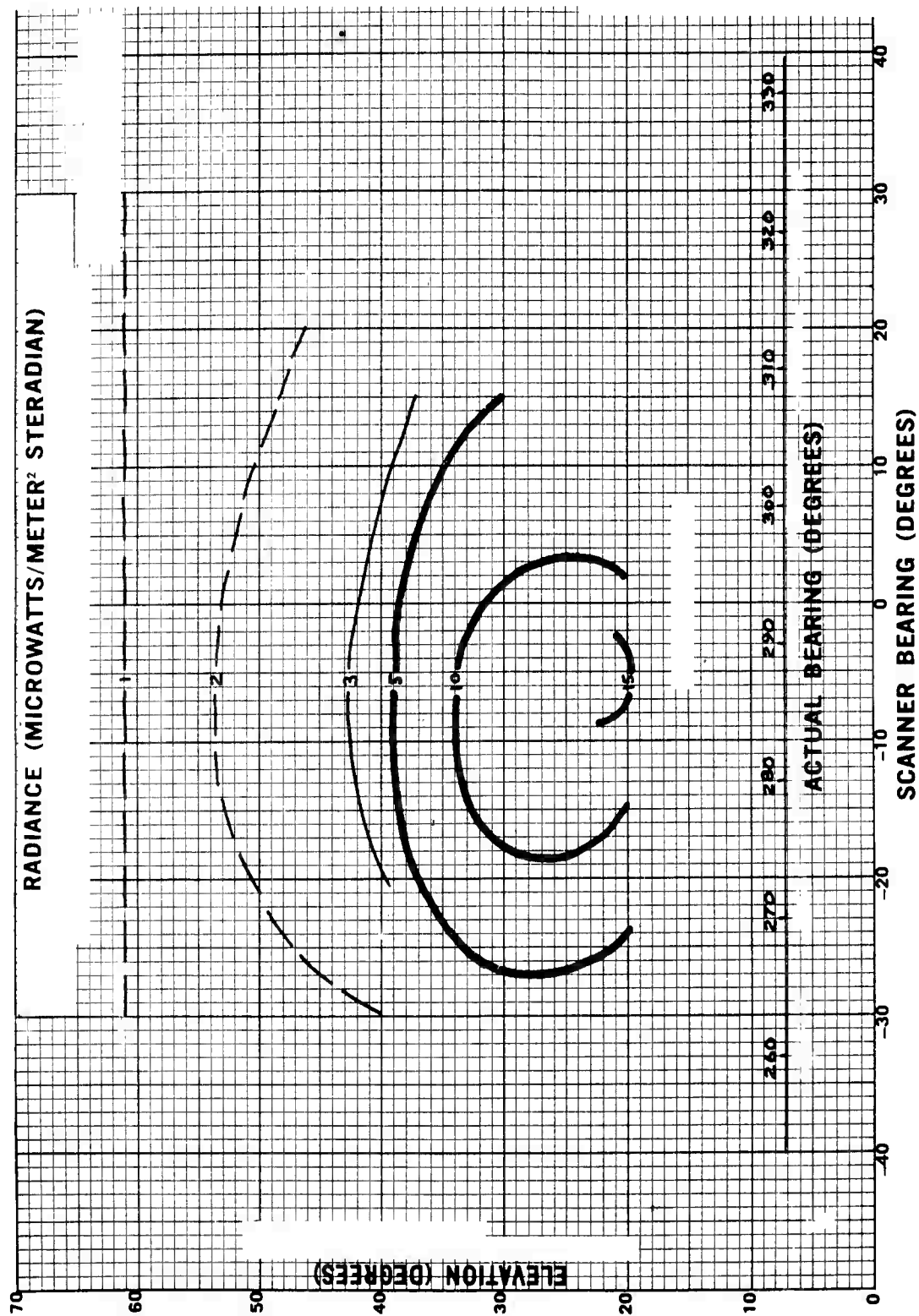


Figure J.444 Sky radiance, Kettie I, King Pk, 0.370 to 0.380 micron, H = 998 buv.



SCANNER BEARING (DEGREES)

Figure 3.445 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H+1,056 sec.

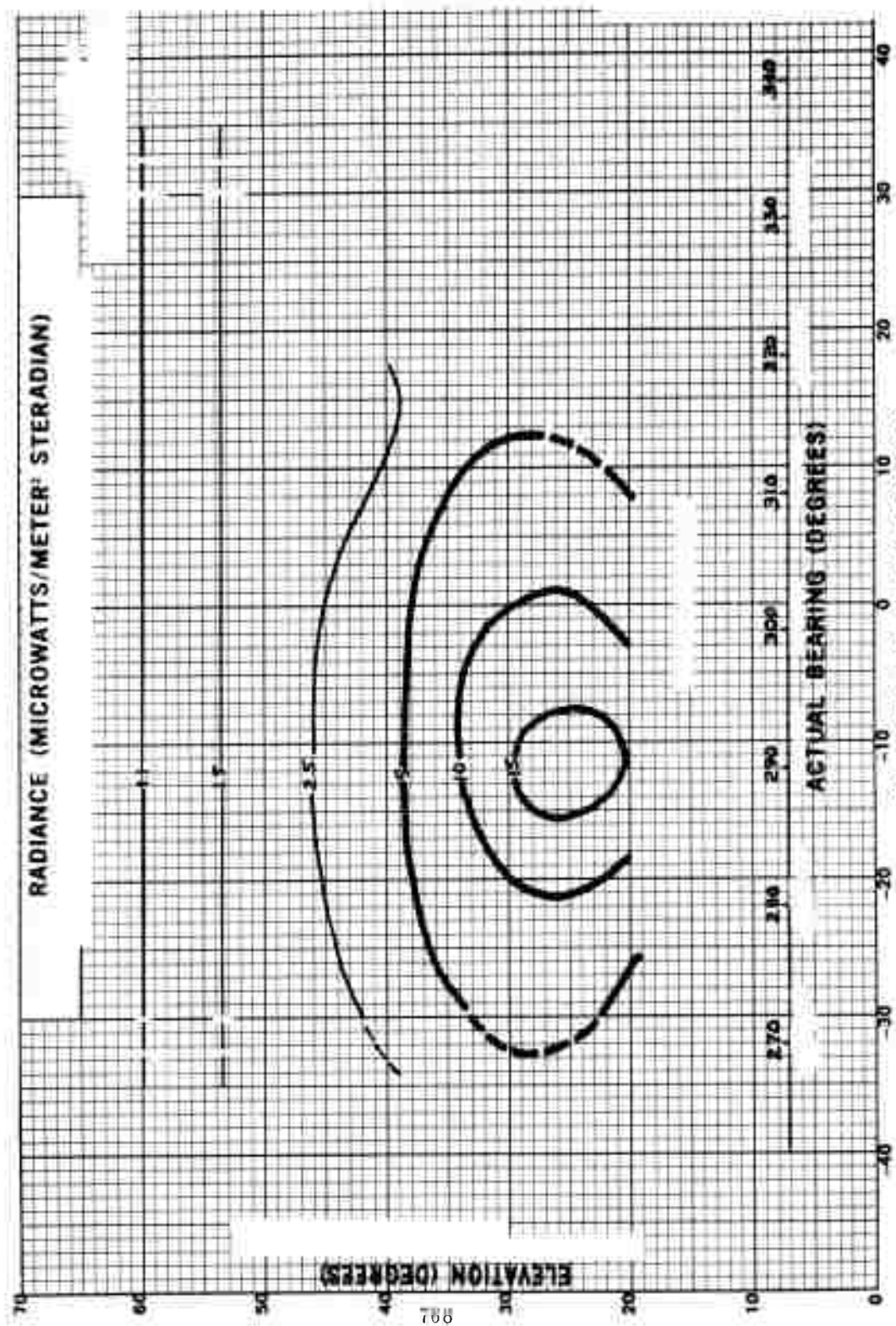


Figure 3.446 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H+1.124 sec.

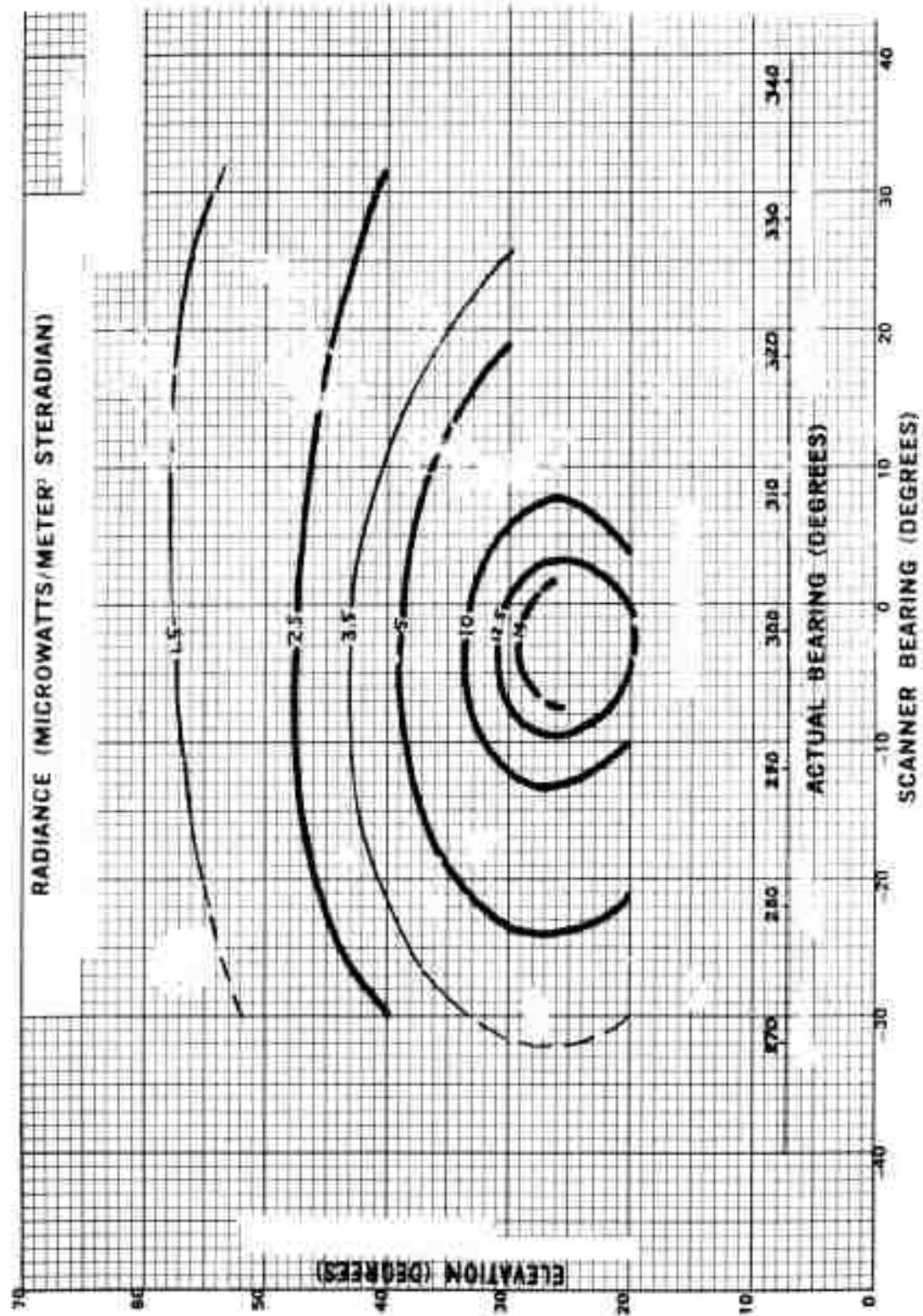


Figure 3.447 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H+1,191 sec.

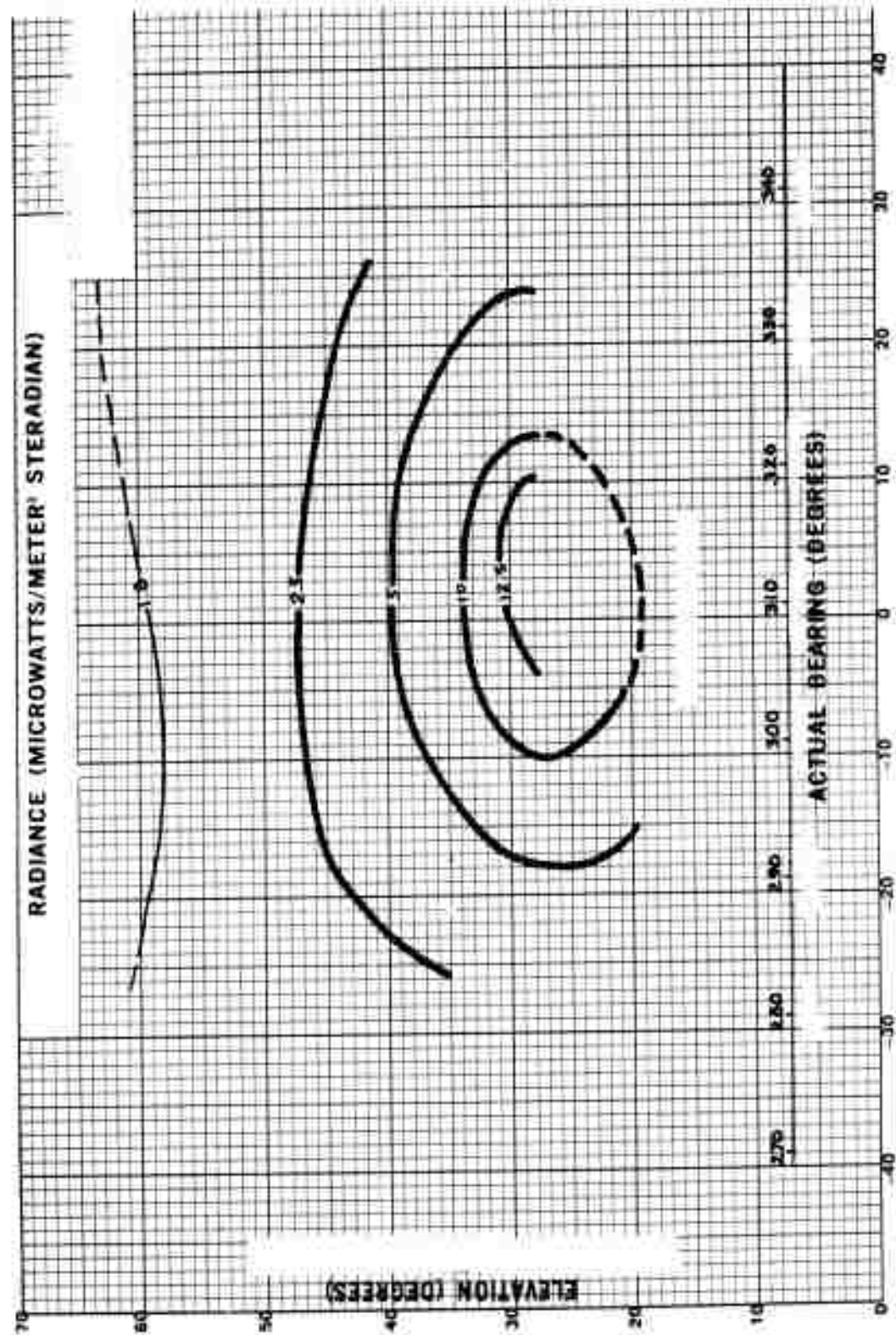


Figure 3.449 Sky radiance, Kettle I, King Fish, 0.373 to 0.398
interon: H + 1.0.00

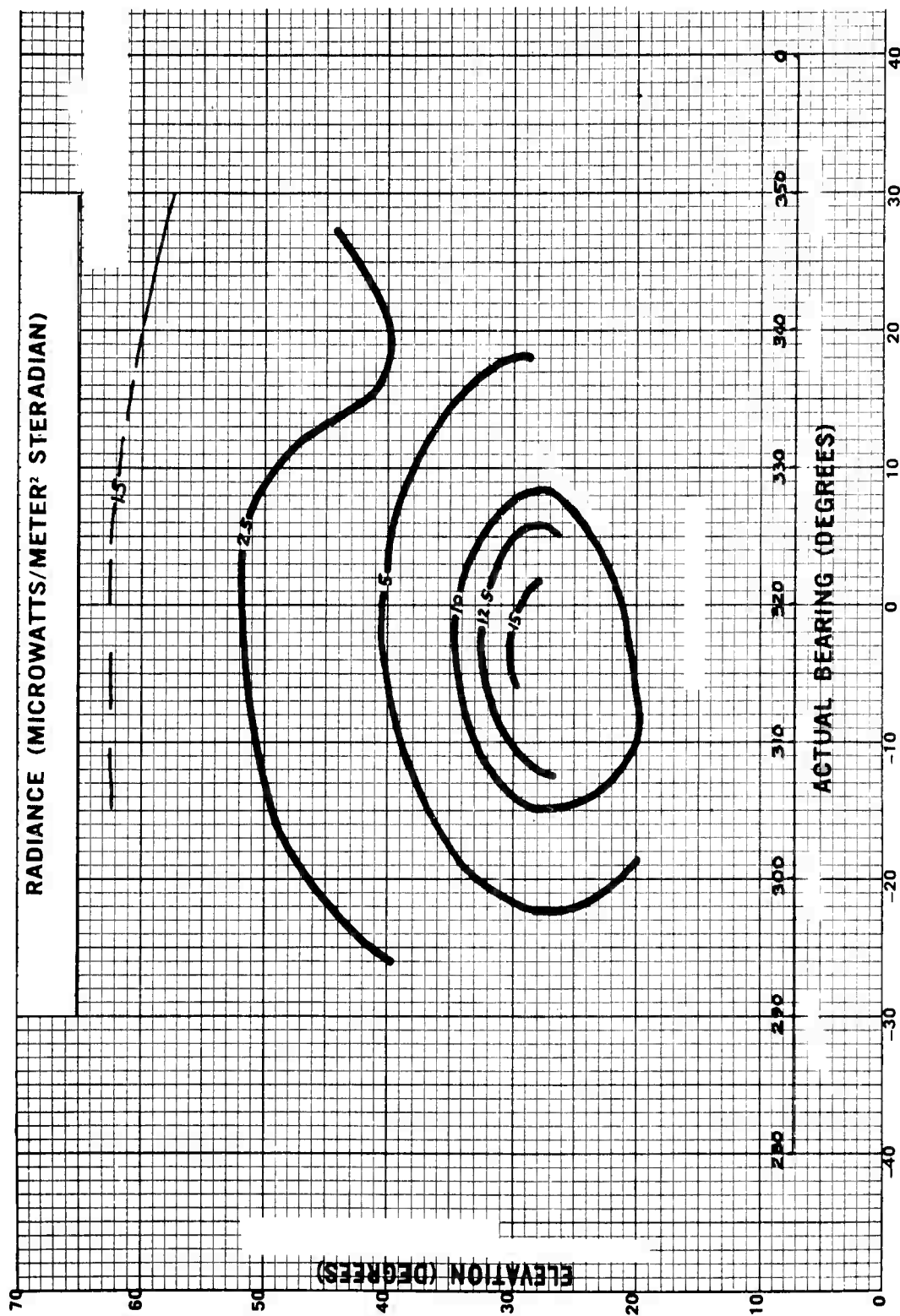


Figure 3.450 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 1,395 sec.

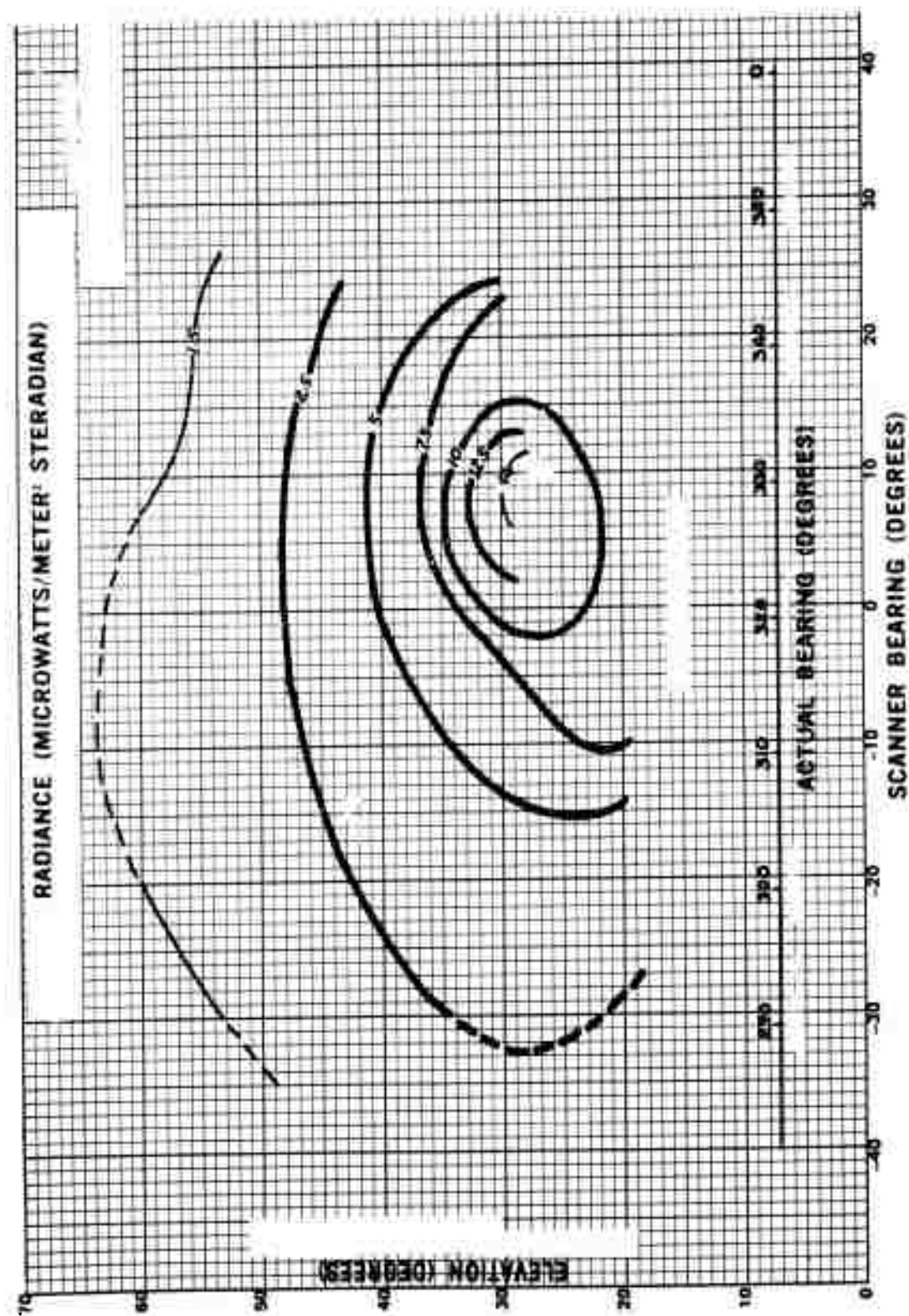


Figure 3-451 Sky radiance, Kettle 1, King Fish, 0.373 to 0.396 microns, H + 1.402 sec.

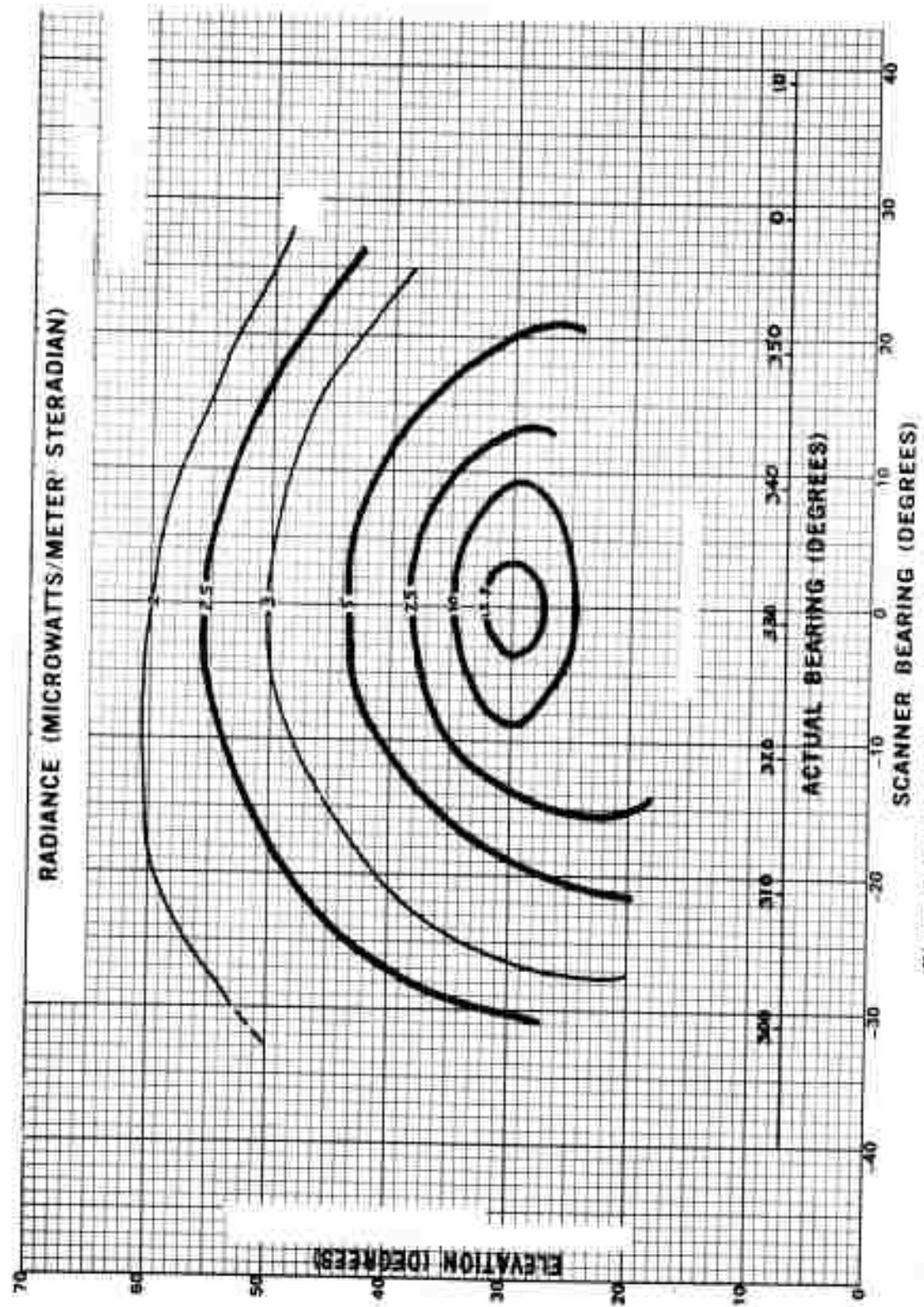


Figure 3-452 Sky radiance, Kettle I, King Fish, 0.373 to 0.365 micro, H + 1,330 sec.

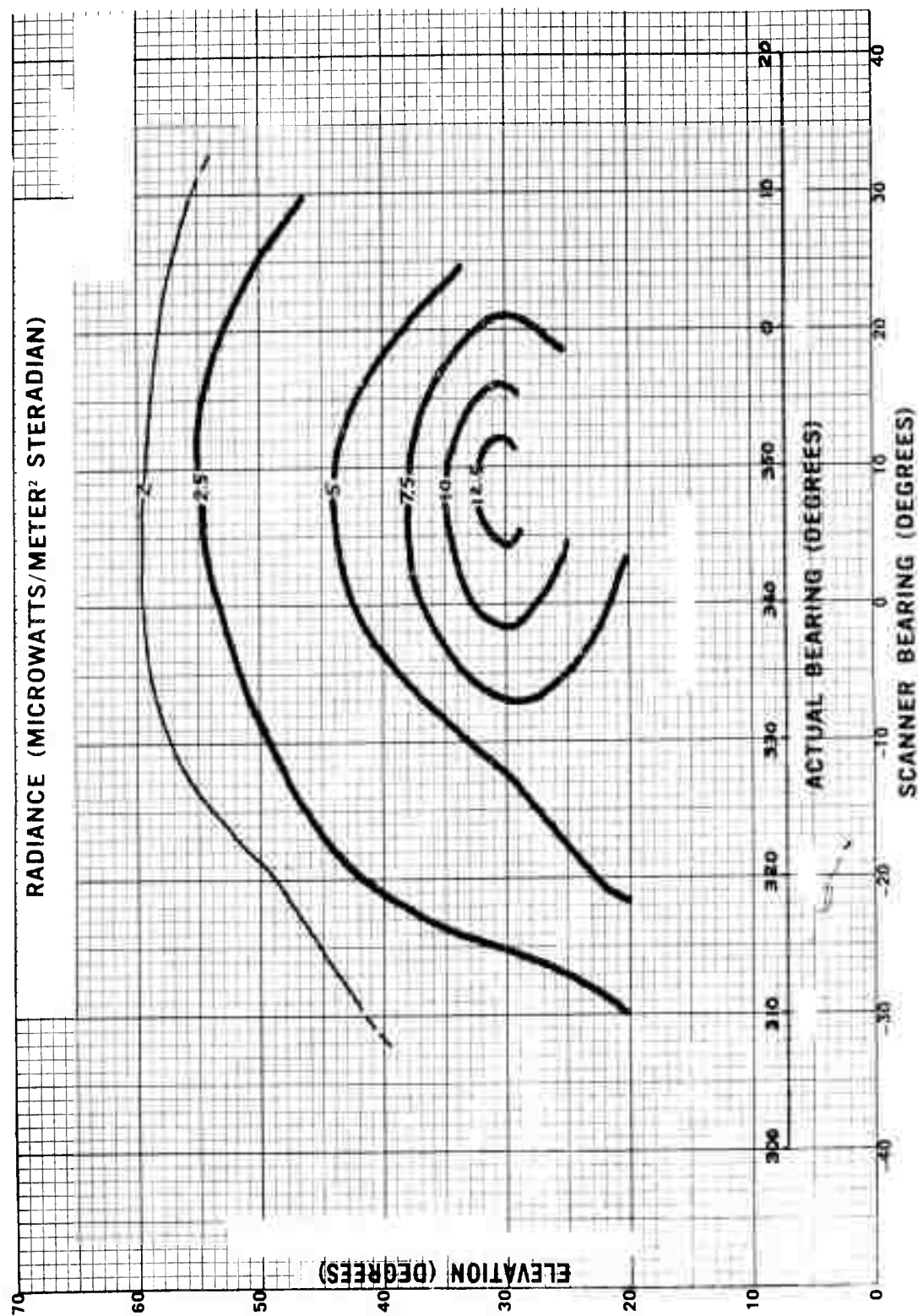


Figure 9-4/3 Sky radiance, Kettia I, King Fish, 0.37H to 0.896 micron, $H = 1,066$ sec.

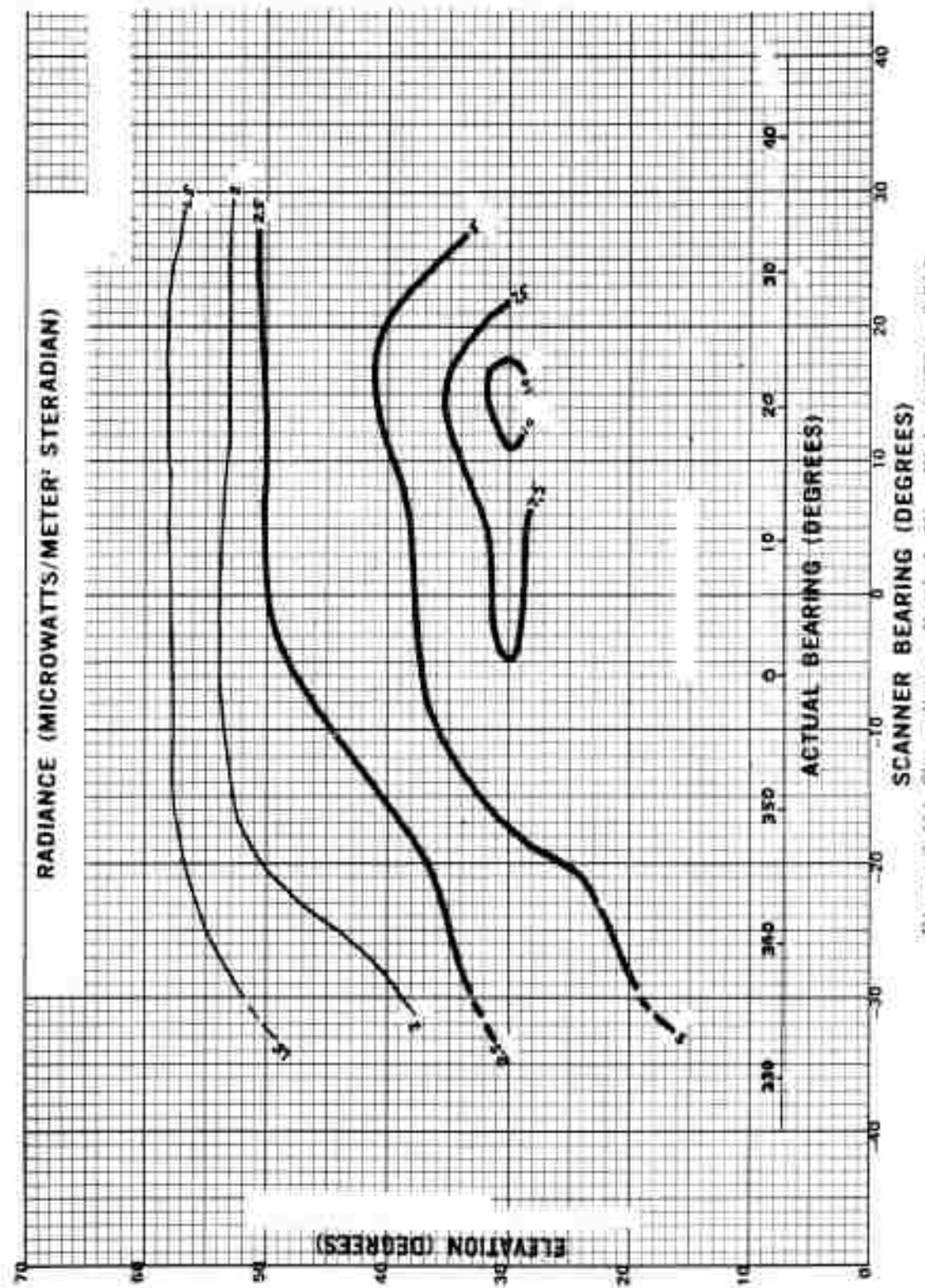


Figure 3.4.14 Sky radiance, Kettle 1, King Fish, 0.373 to 0.396 micron, H = 1.937 sec.

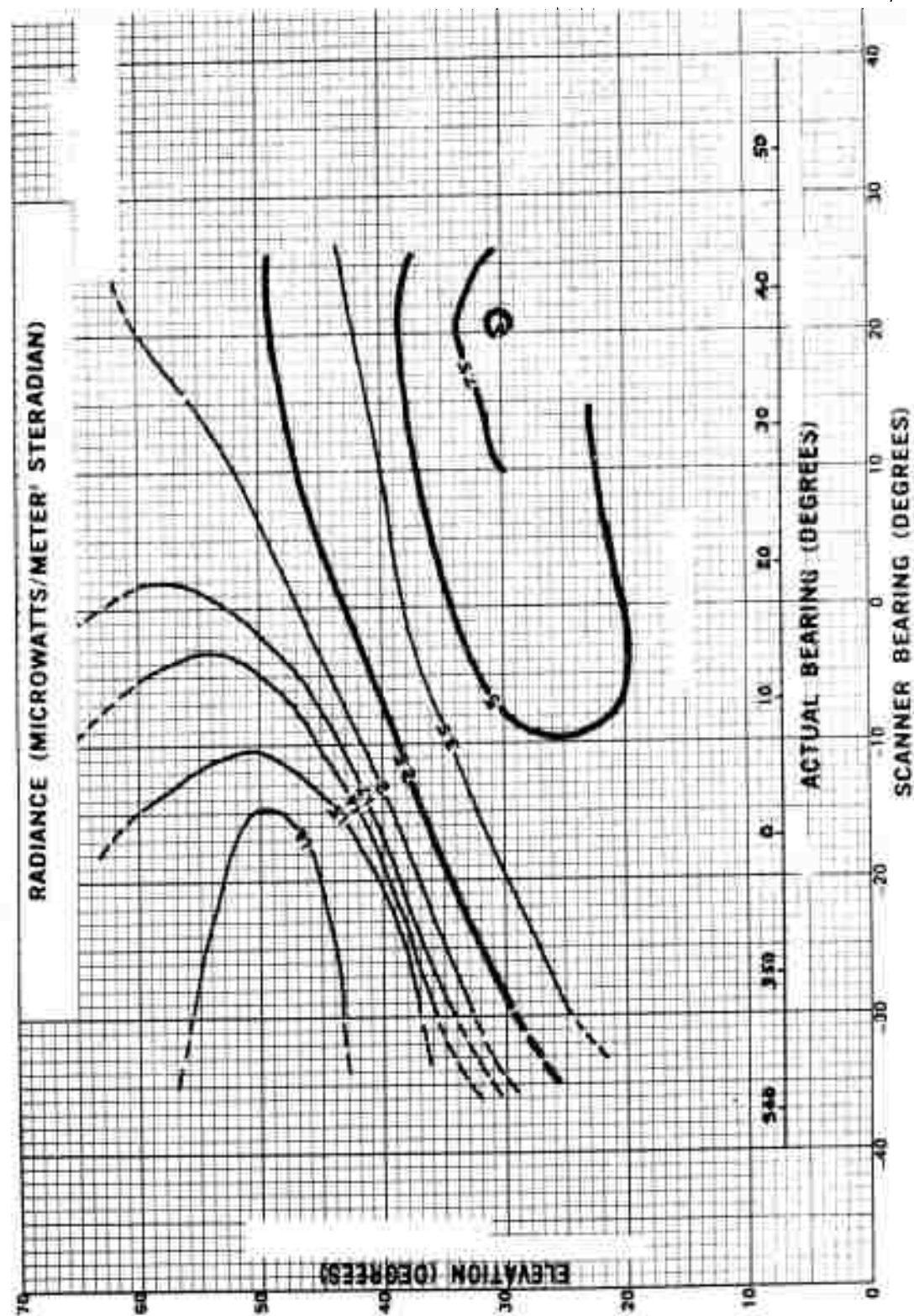


Figure 3.455 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 2,072 sec.

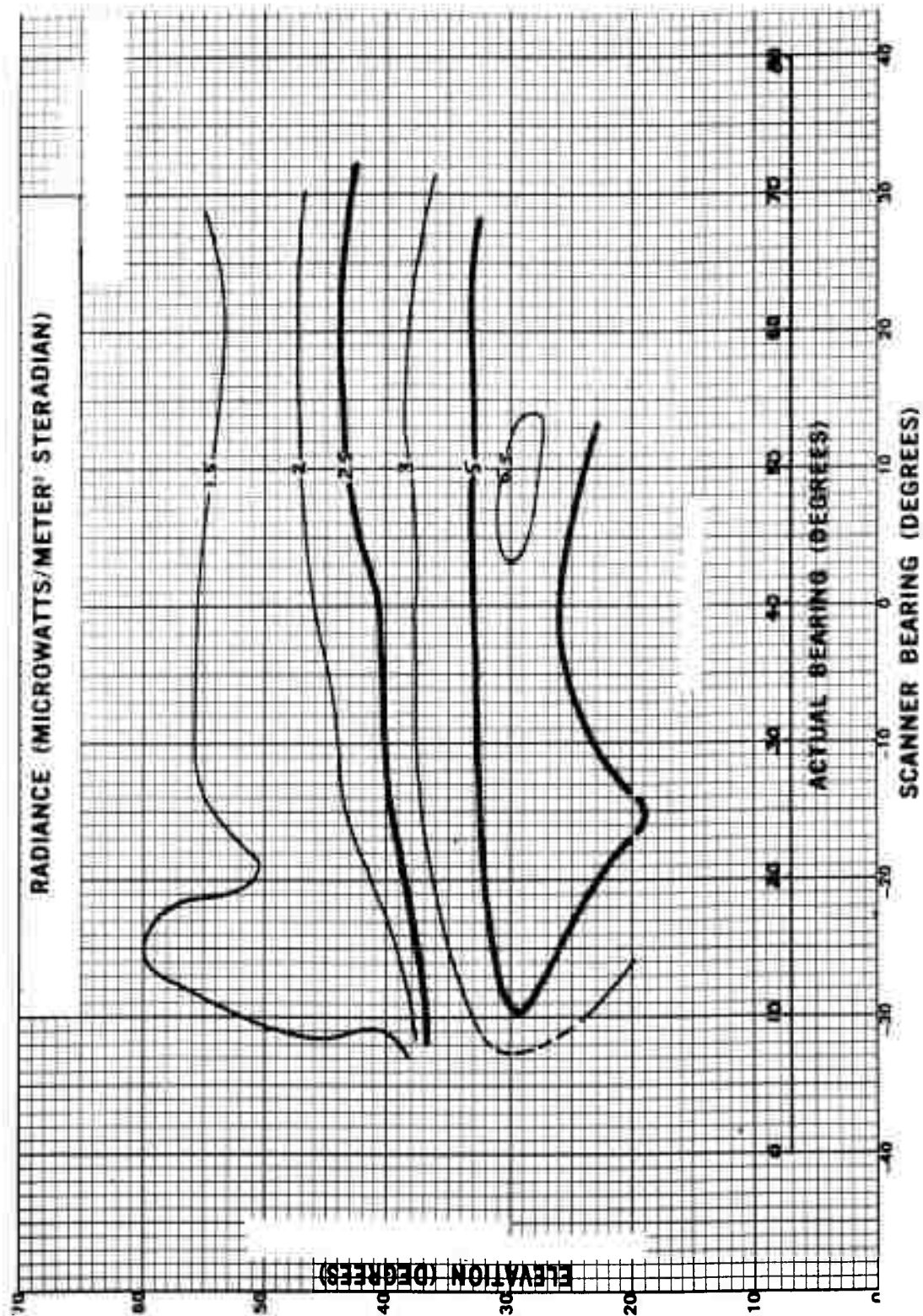


Figure 3.456 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron; H + 2,276 sec.

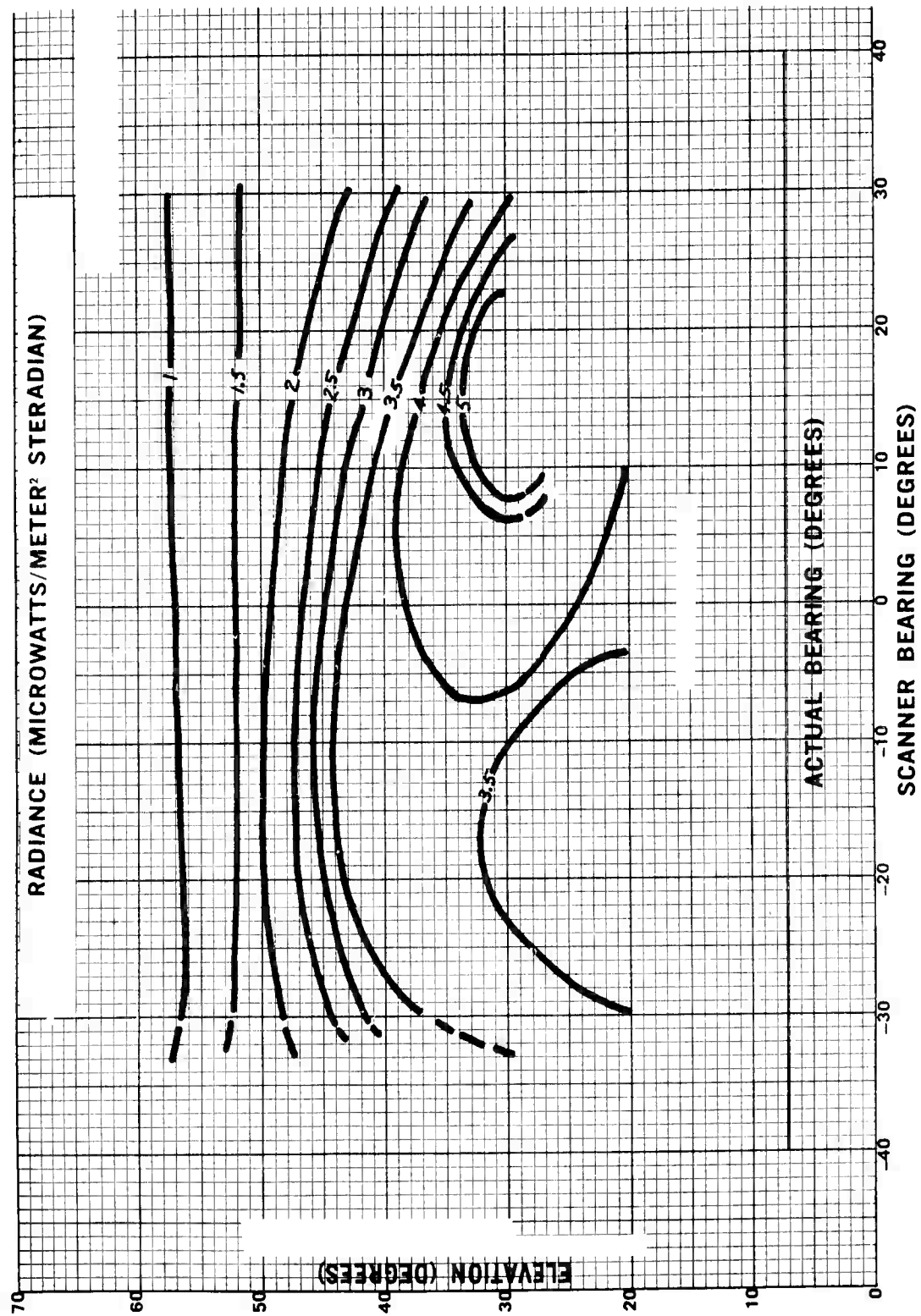


Figure 3.457 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 2,547 sec.

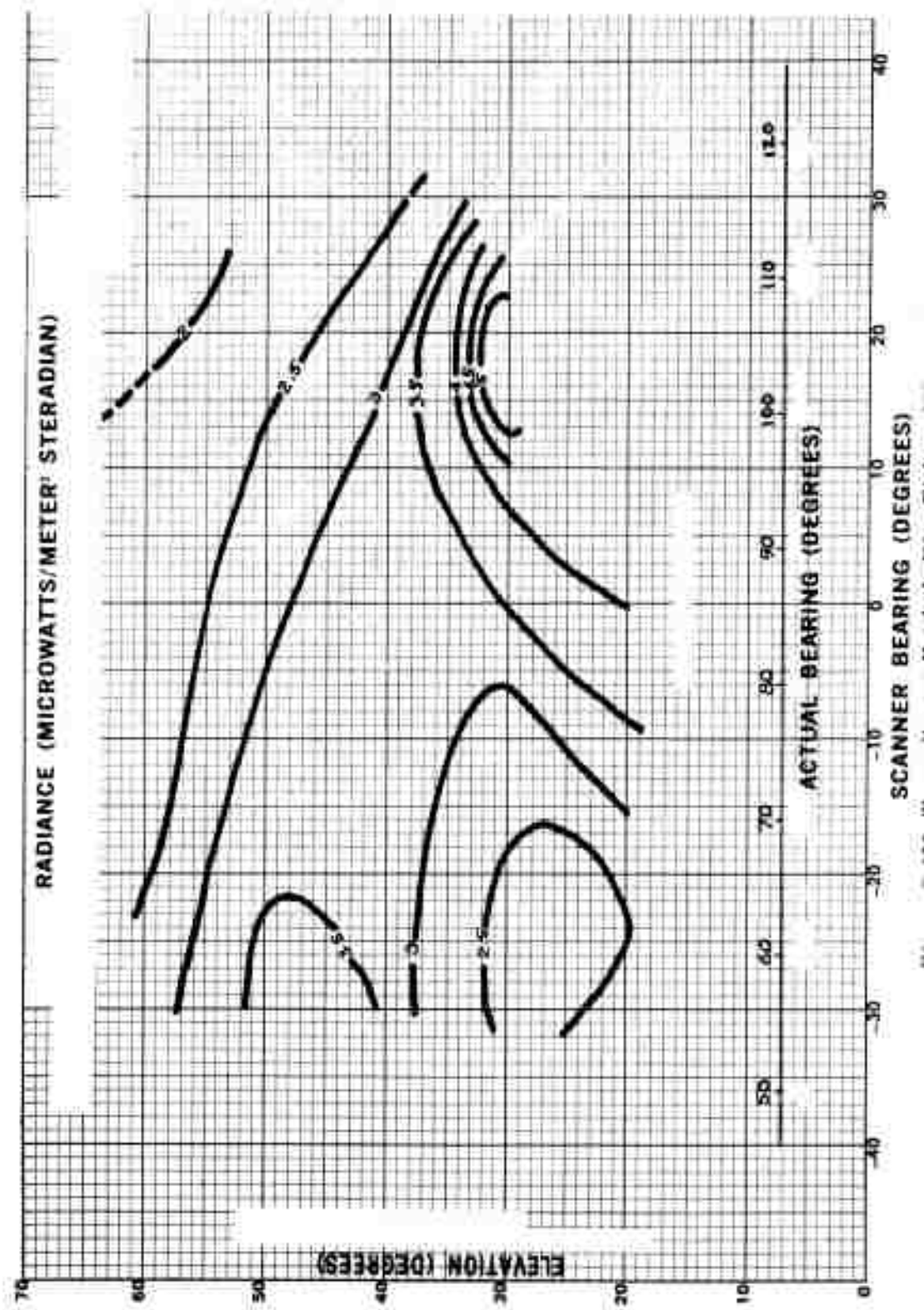


Figure 3.458 Sky radiance, Kettle 1, King Fish, 0.373 to 0.396 micron, H = 2,750 sec.

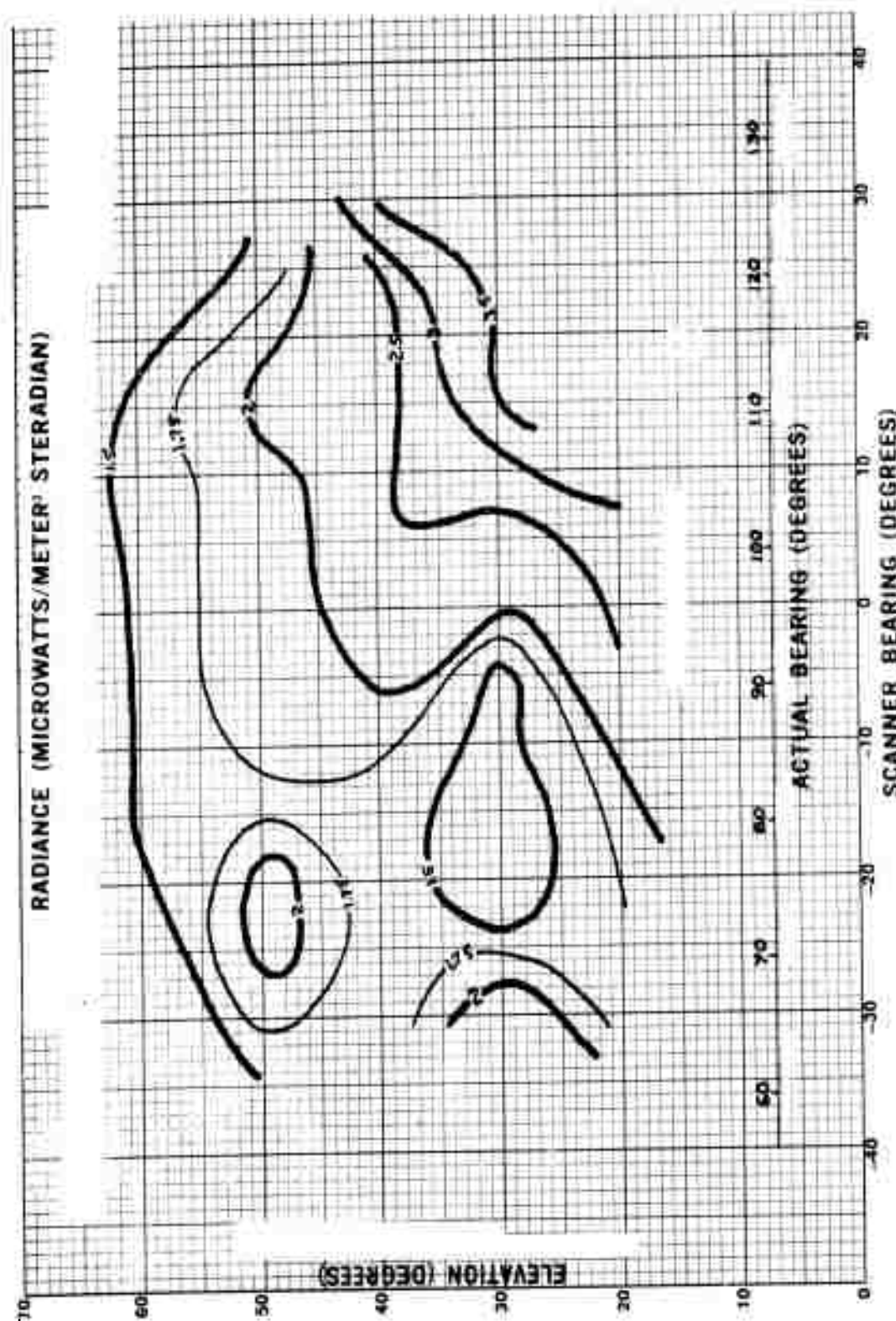


Figure 3.419 Sky radiance, Kettle 1, King Fish, 0.173 to 0.396
micron, H + 2, 650 sec.

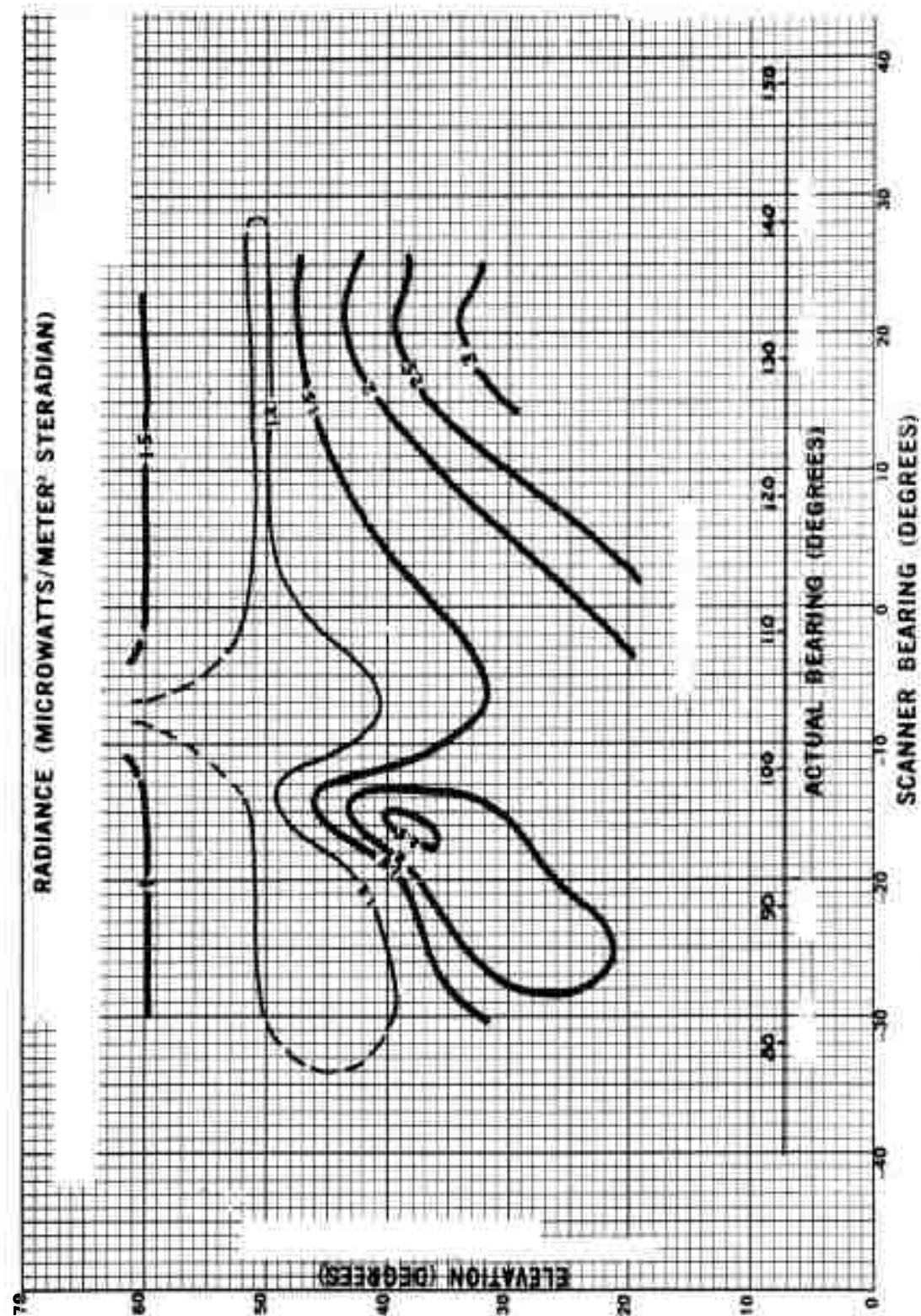


Figure 3.460 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H+3,089 sec.

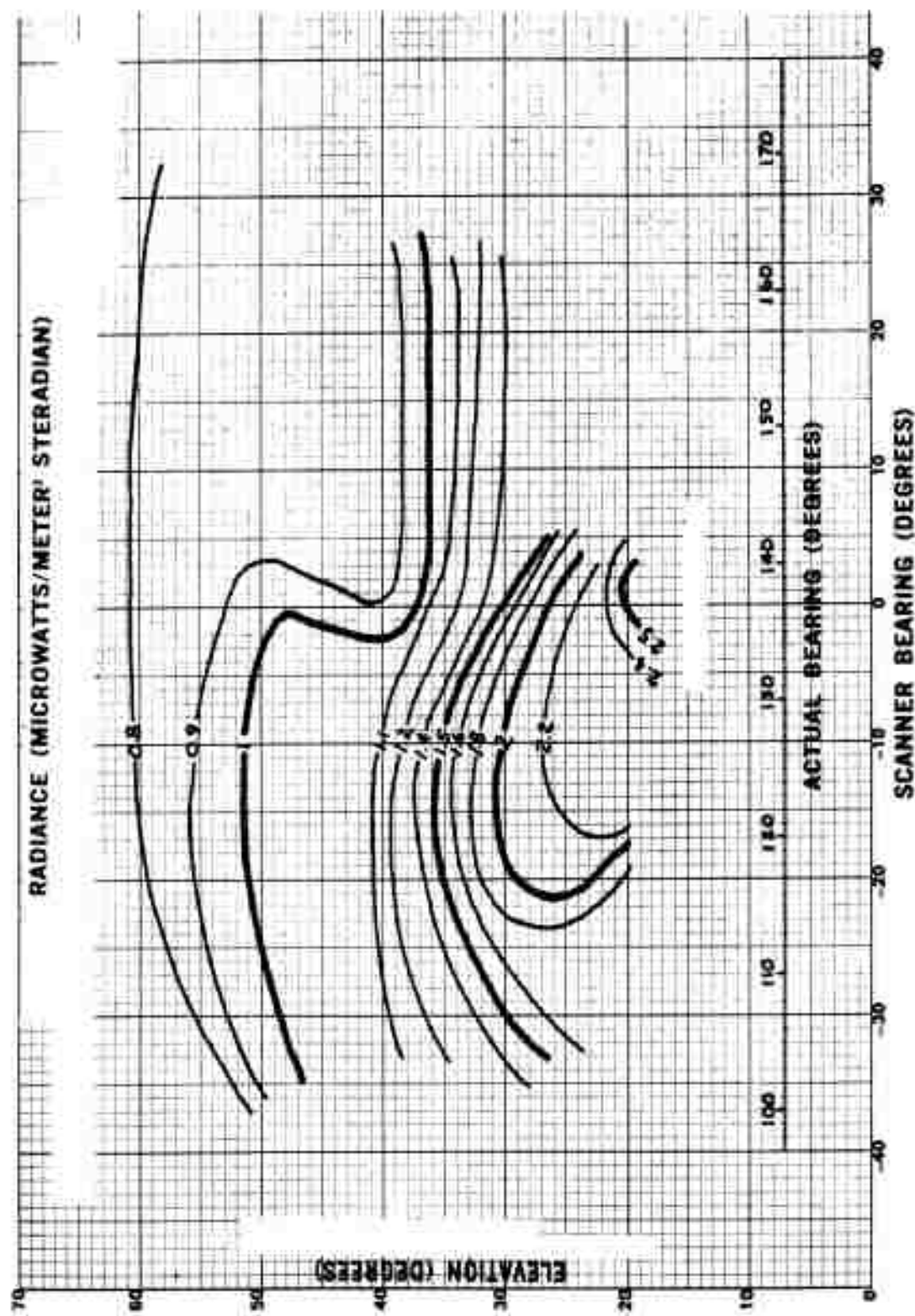


Figure 3.461 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H+3.360 sec.

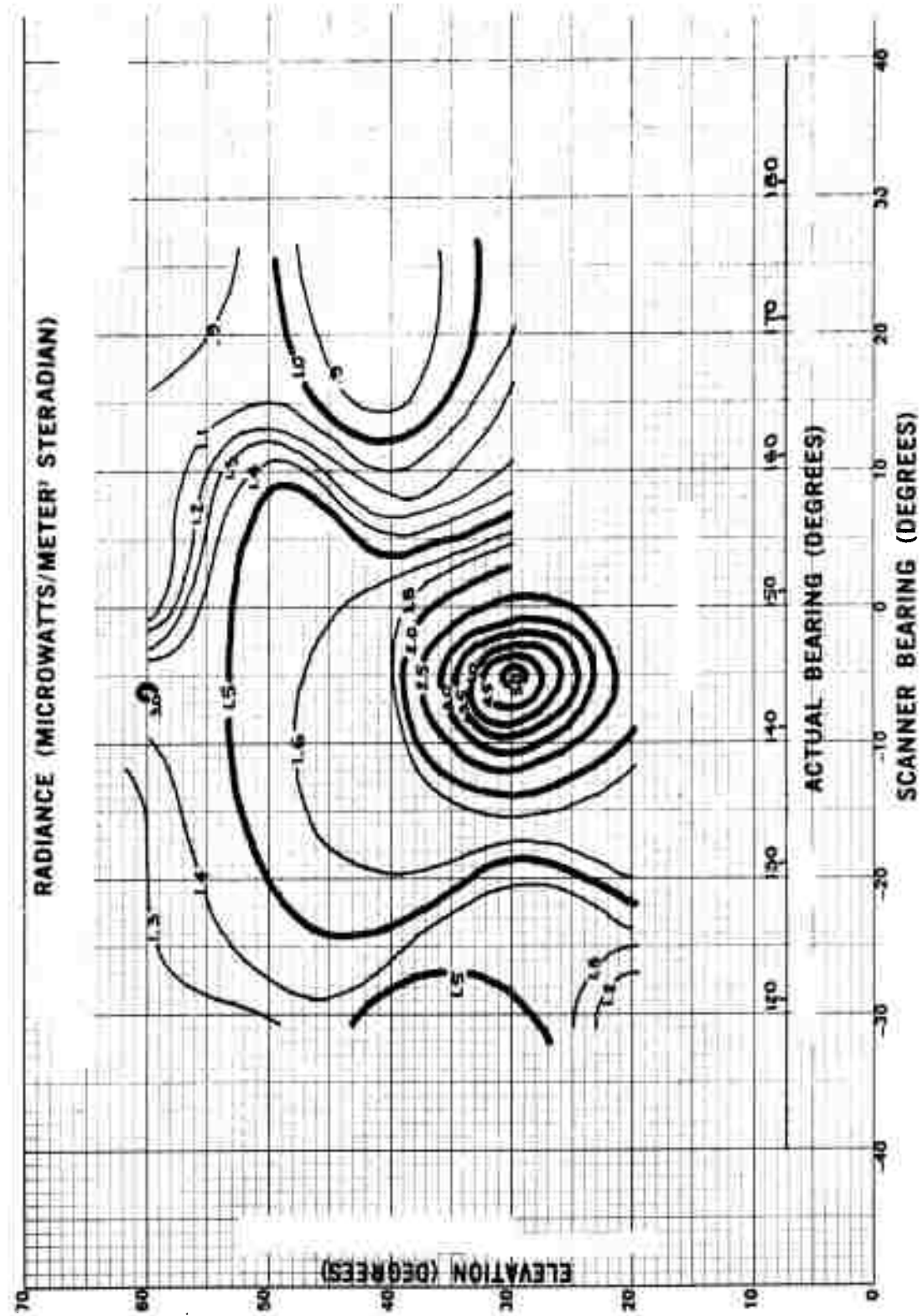


Figure 3.462 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 3,632 sec.

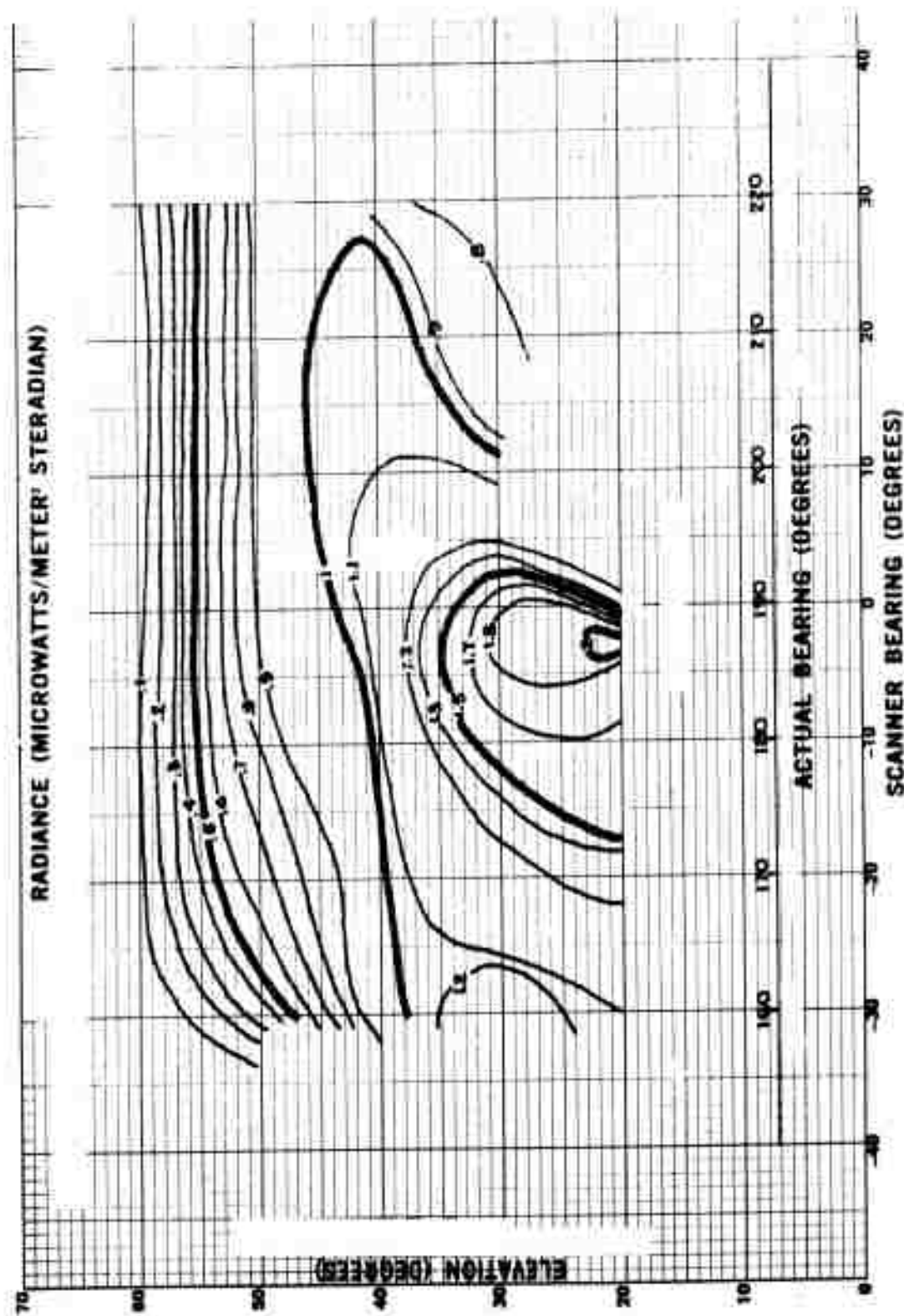


Figure 3.483 Sky radiance, Kettle I, King Field, 0.179 to 0.395 micron, $H = 0.003$ sec.

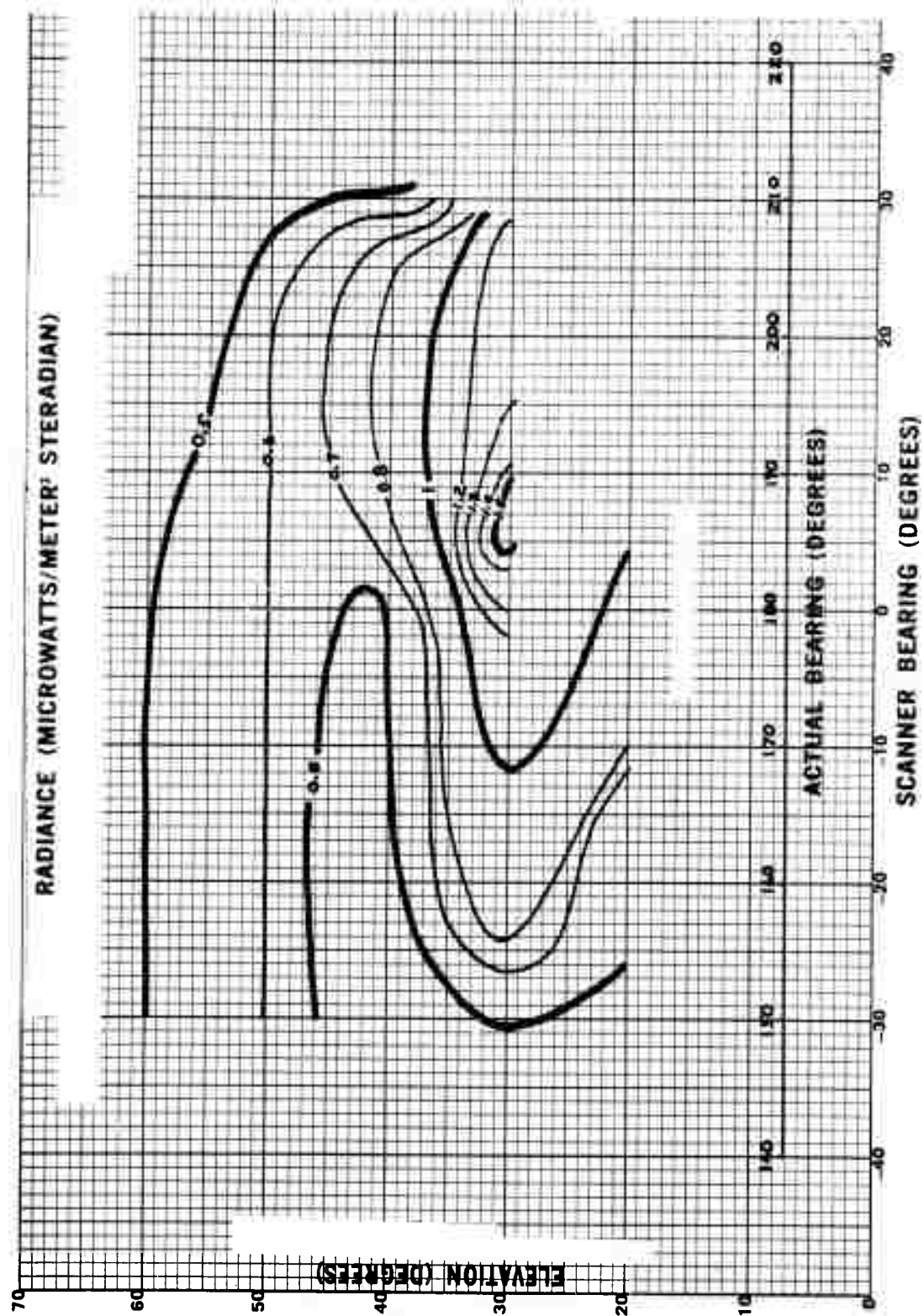


Figure 3.464 Sky radiance, Kettle I, King Fish, 0.373 to 0.396 micron, H + 4,174 sec.

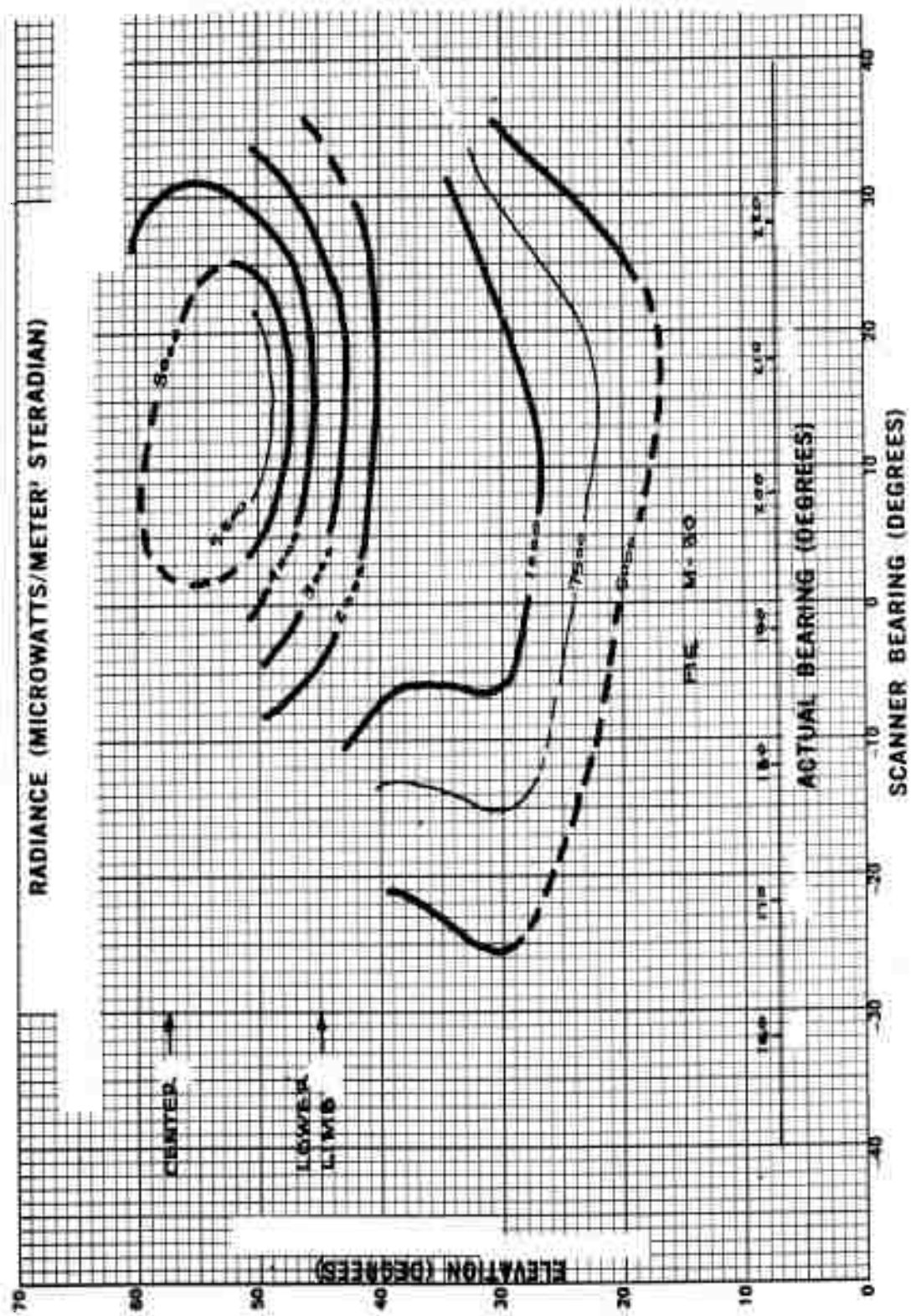


Figure 3.465 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 52 sec.

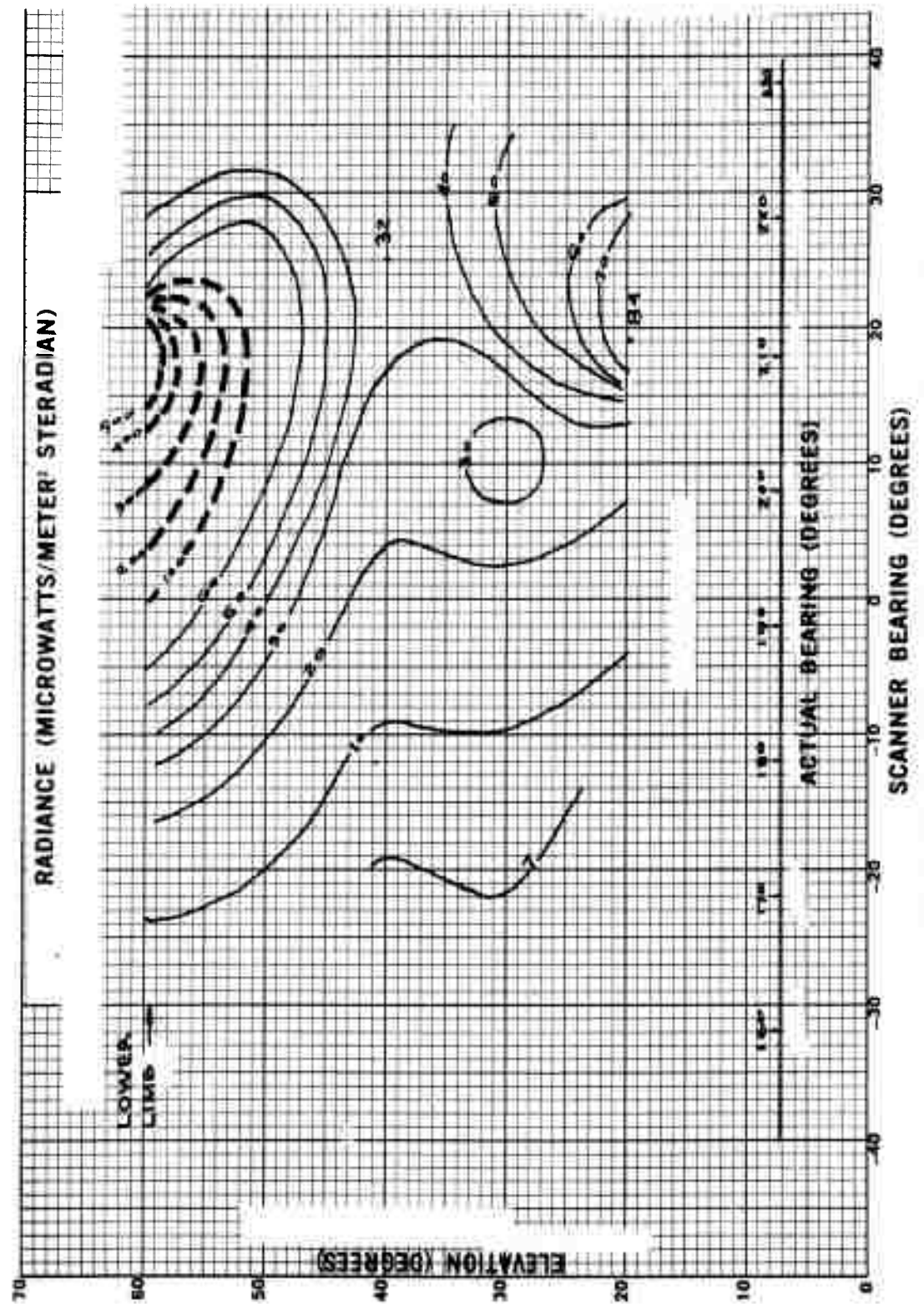


Figure 3.466 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 120 sec.

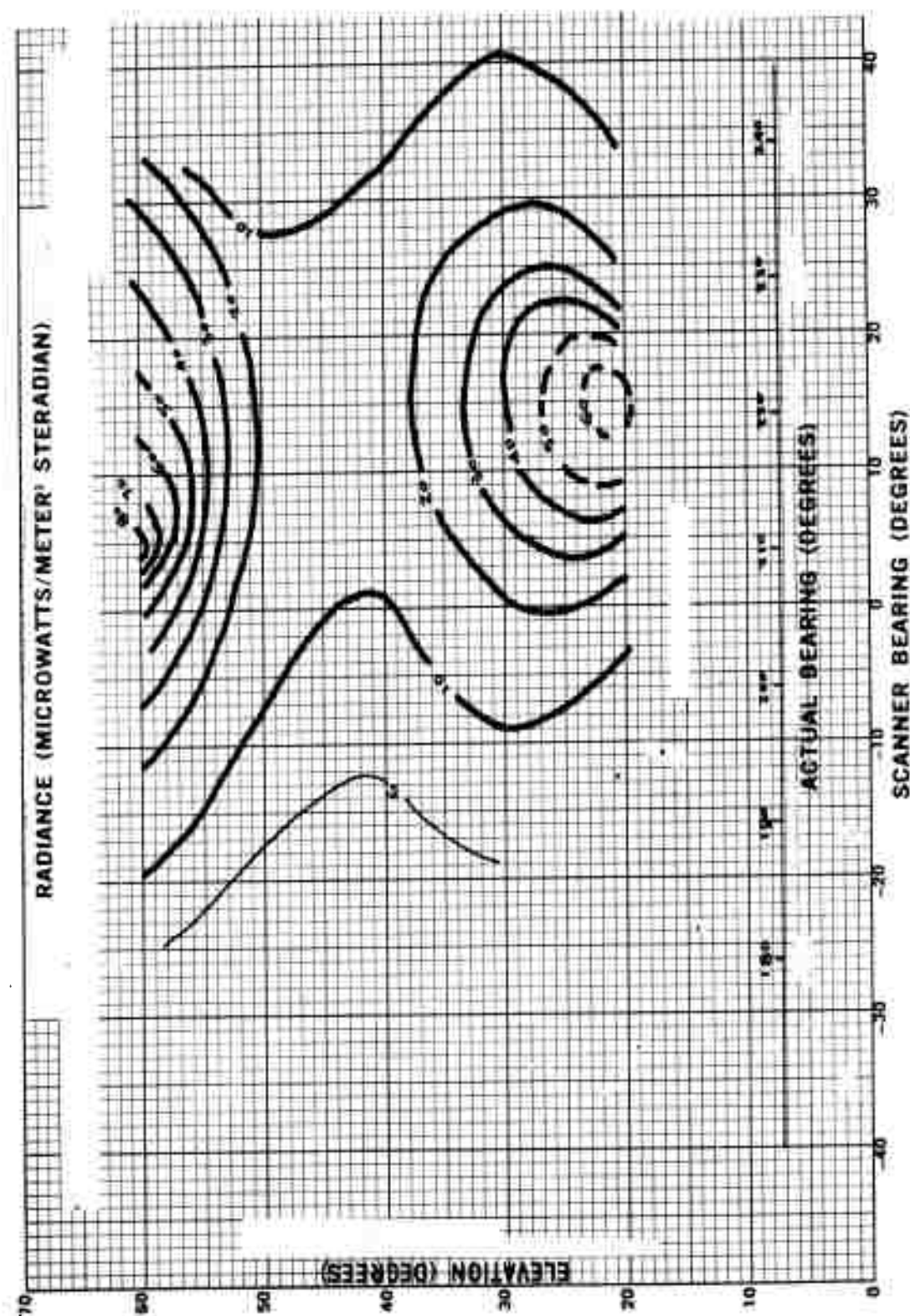


Figure 3.467 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 188 sec.

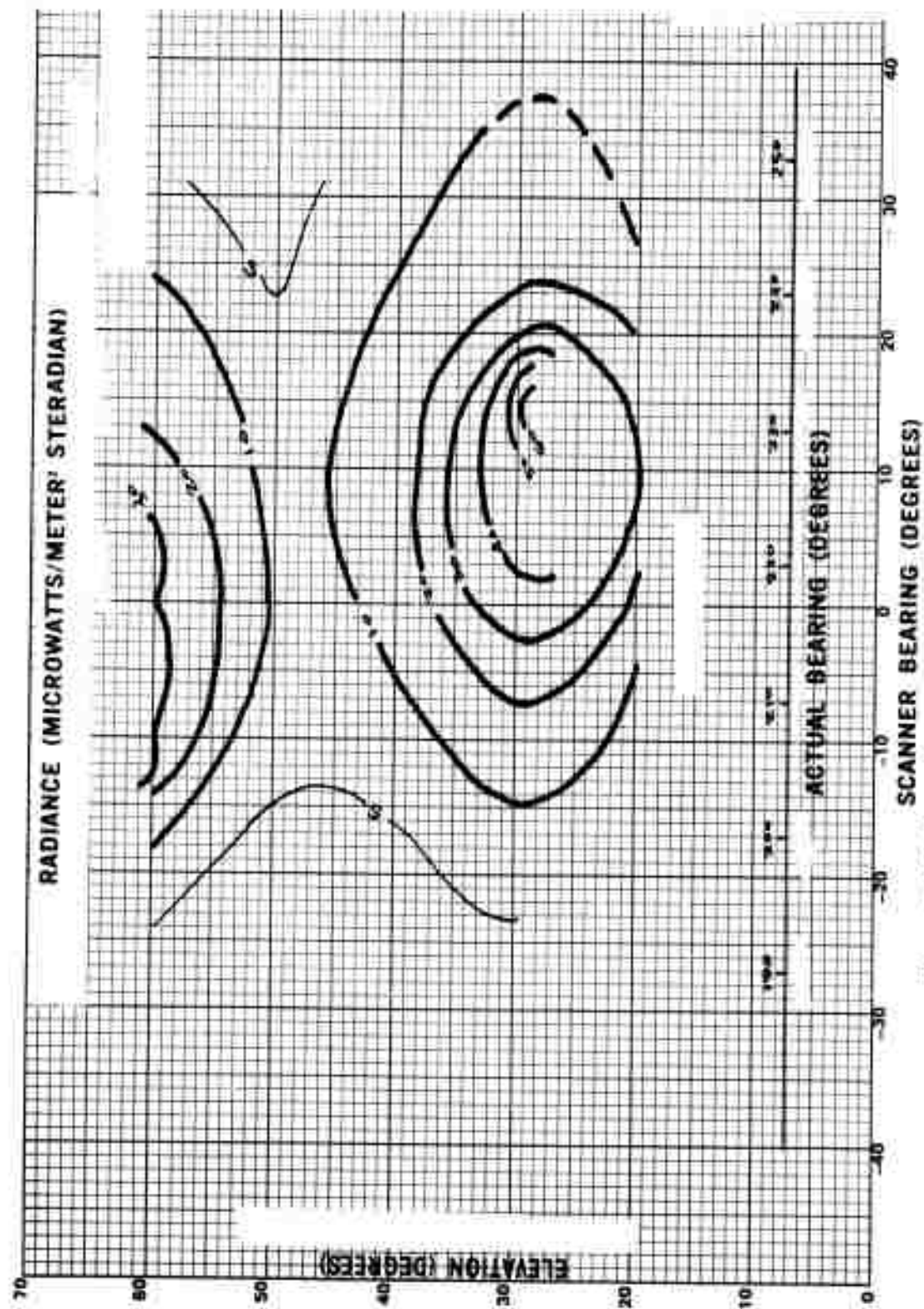


Figure 3.468 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 255 sec.

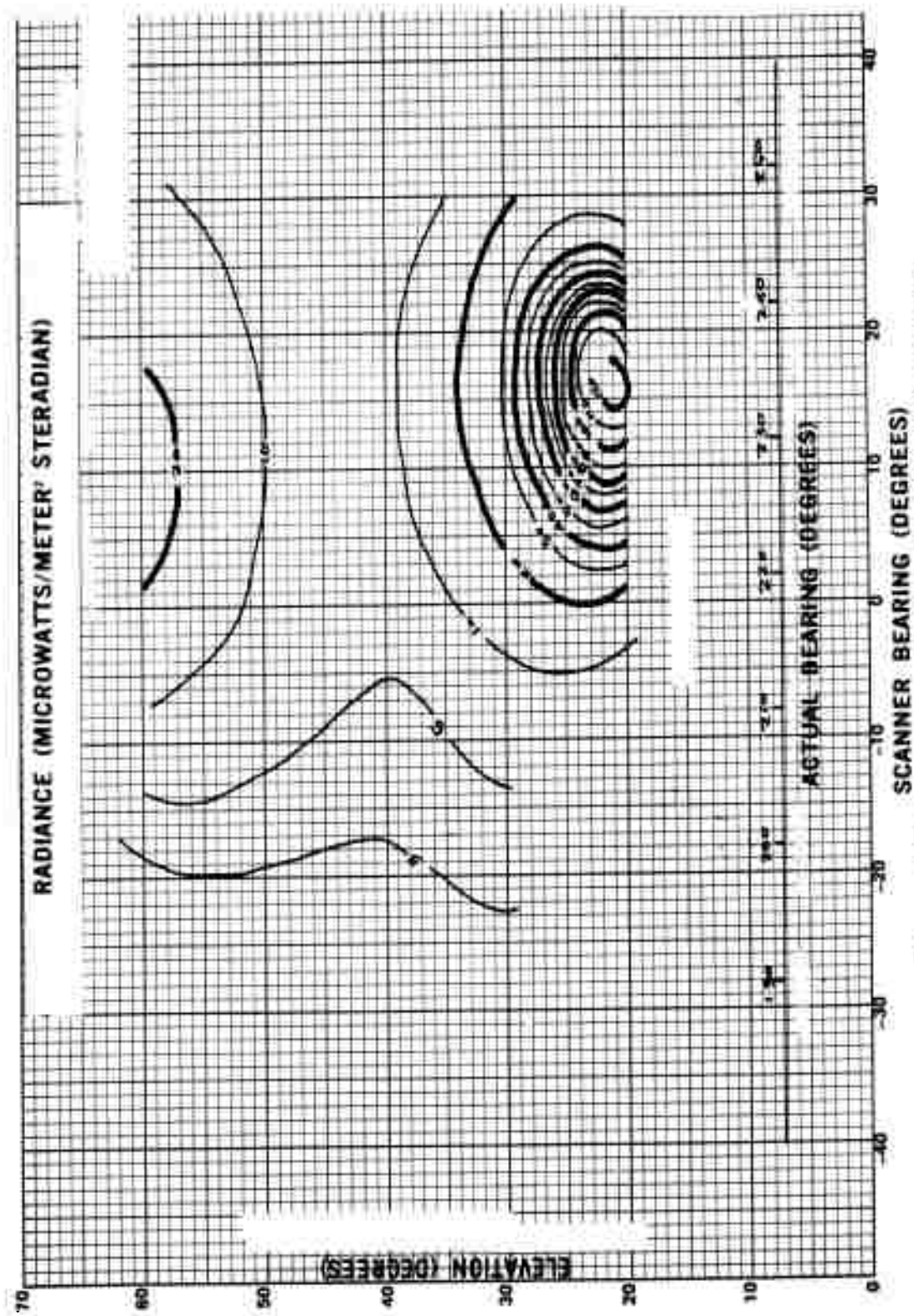


Figure 3.469 Sky radiance, Kottlo I, King Fish, 0.420 to 0.458 micron, H + 323 sec.

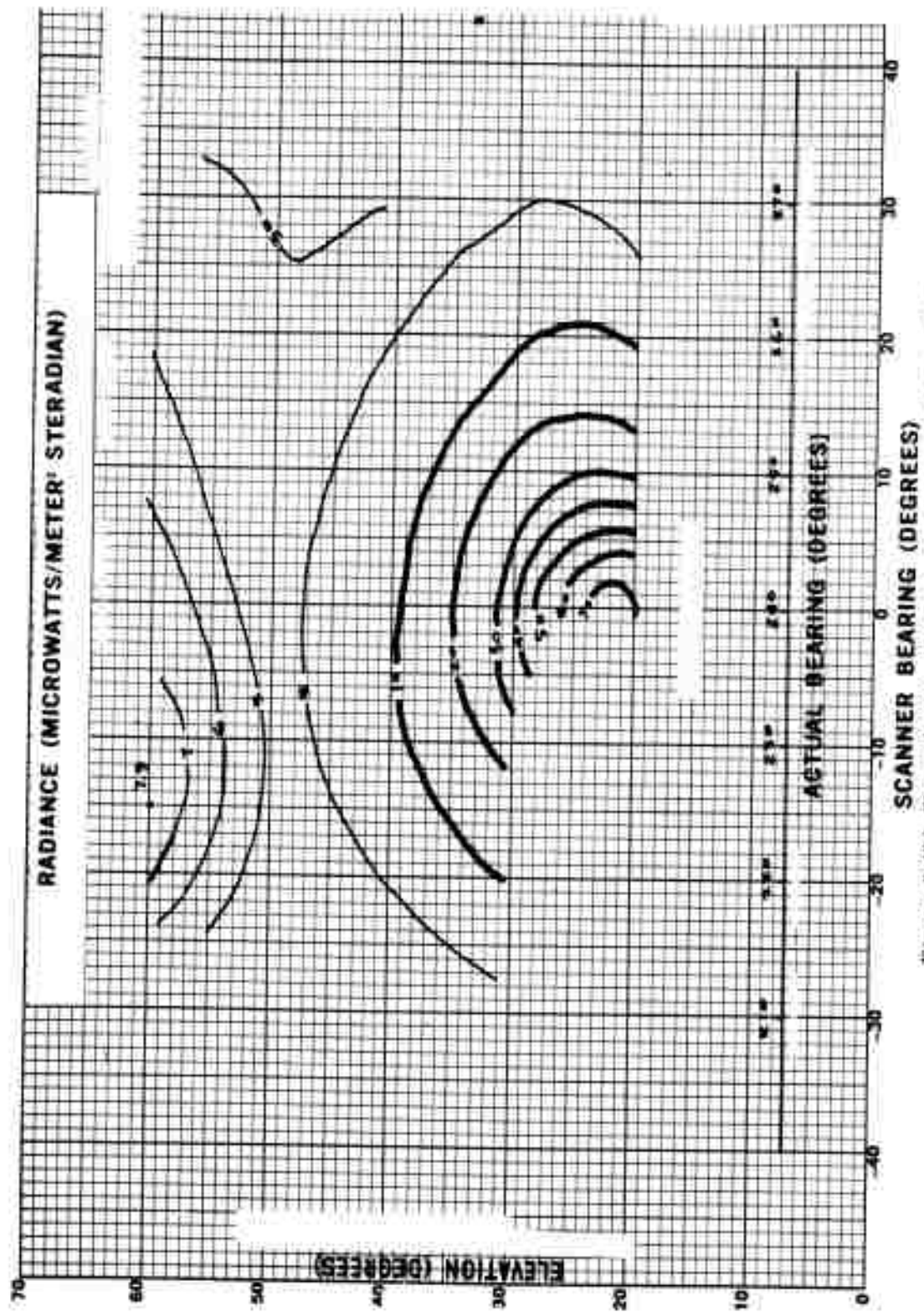


Figure 3.470 Sky radiance, Kettle 1, King Fish, 0.430 to 0.456 micron, H + 390 sec.

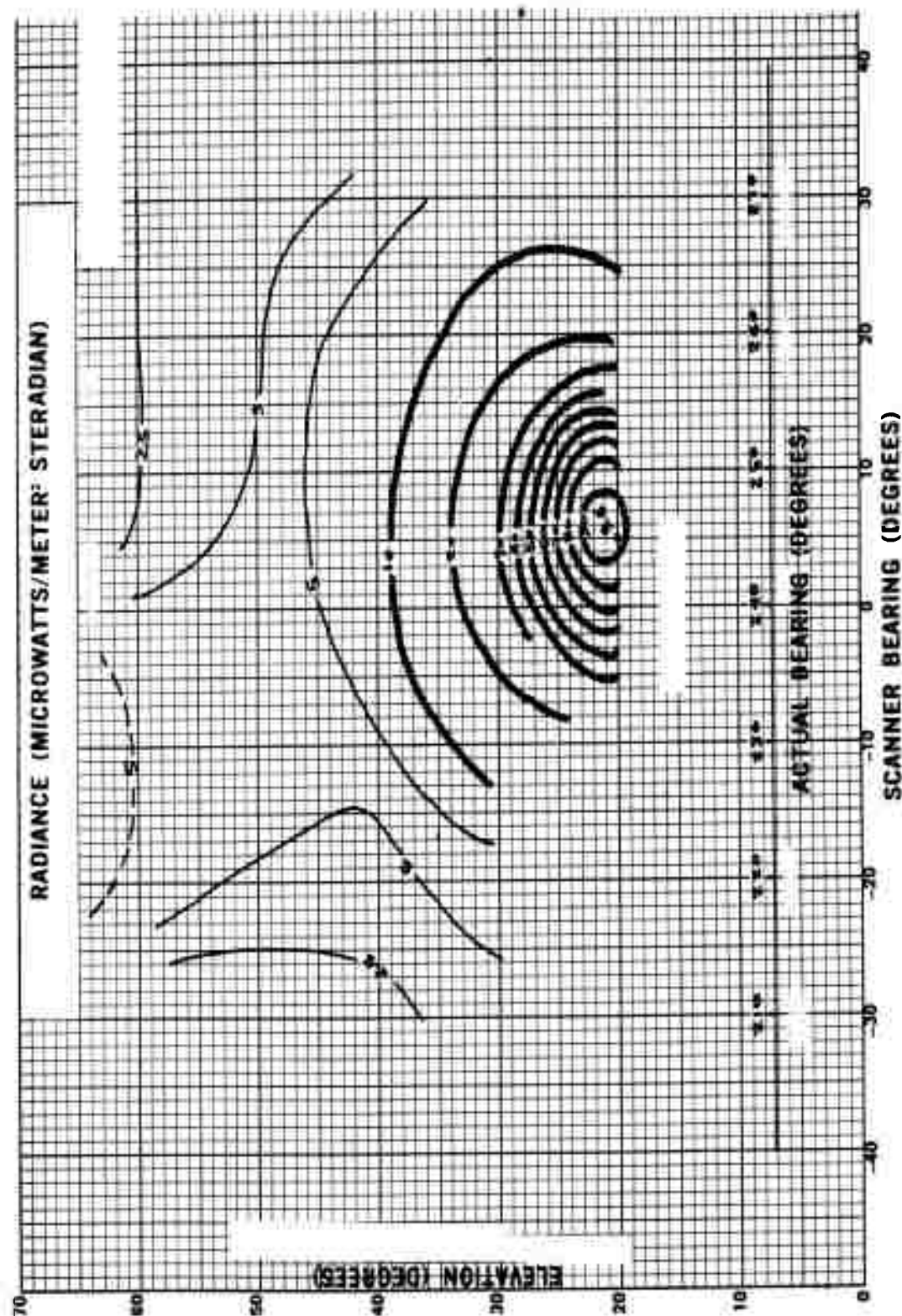


Figure 3.471 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 458 sec.

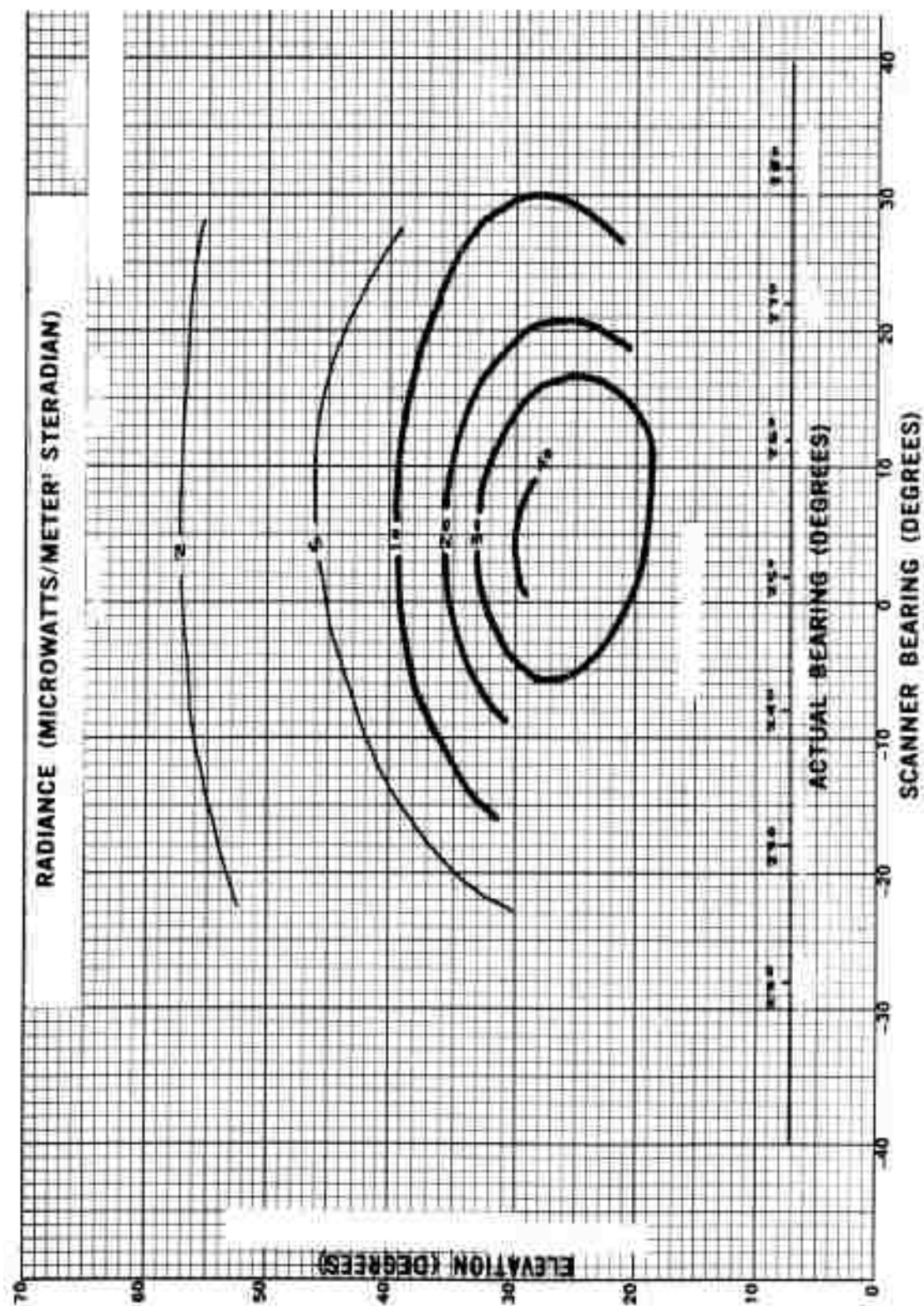


Figure 3.472 Sky radiance, Kettle 1, King Fish, 0.420 to 0.456 microns, H + 526 sec.

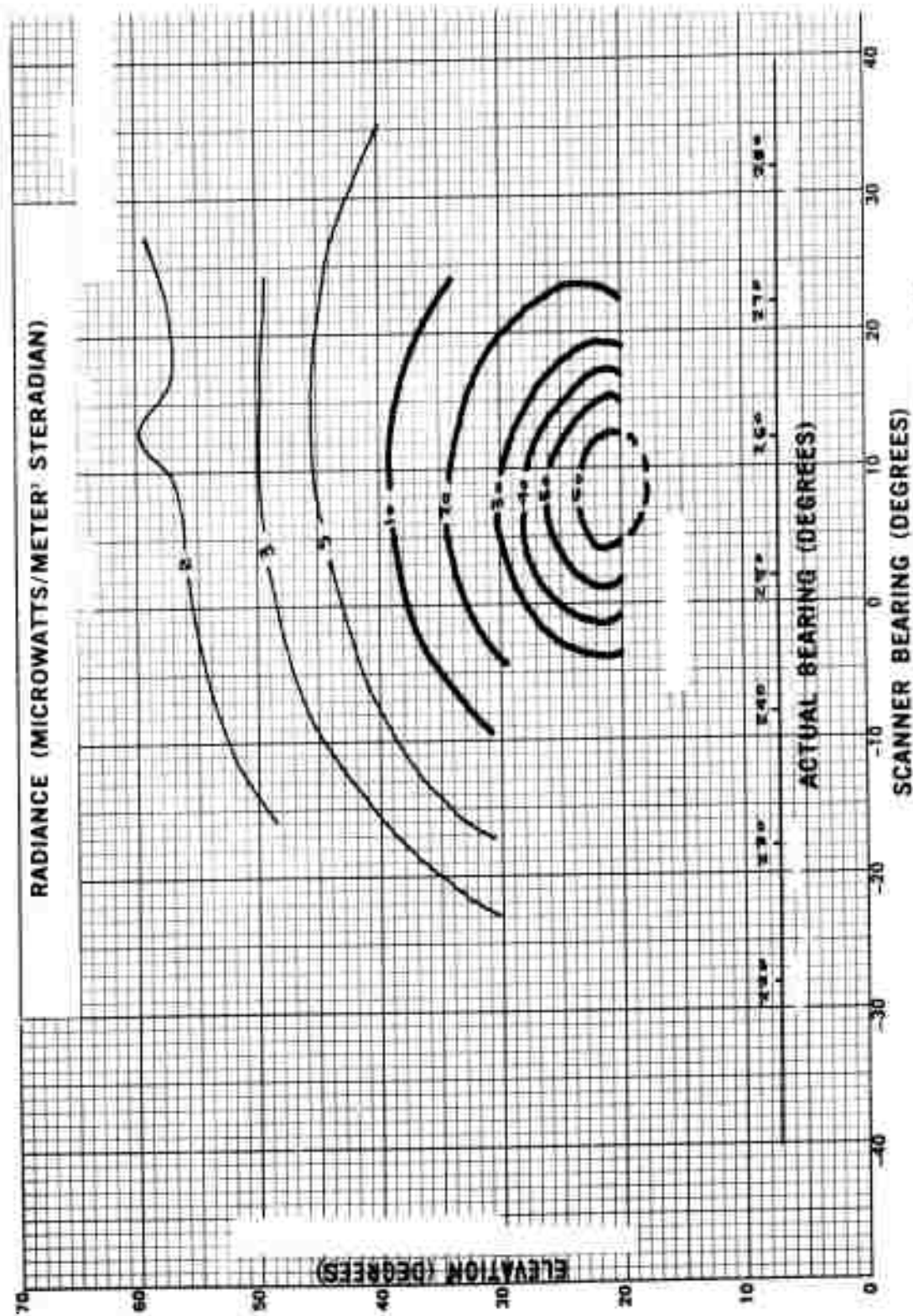


Figure 3.473 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H+593 sec.

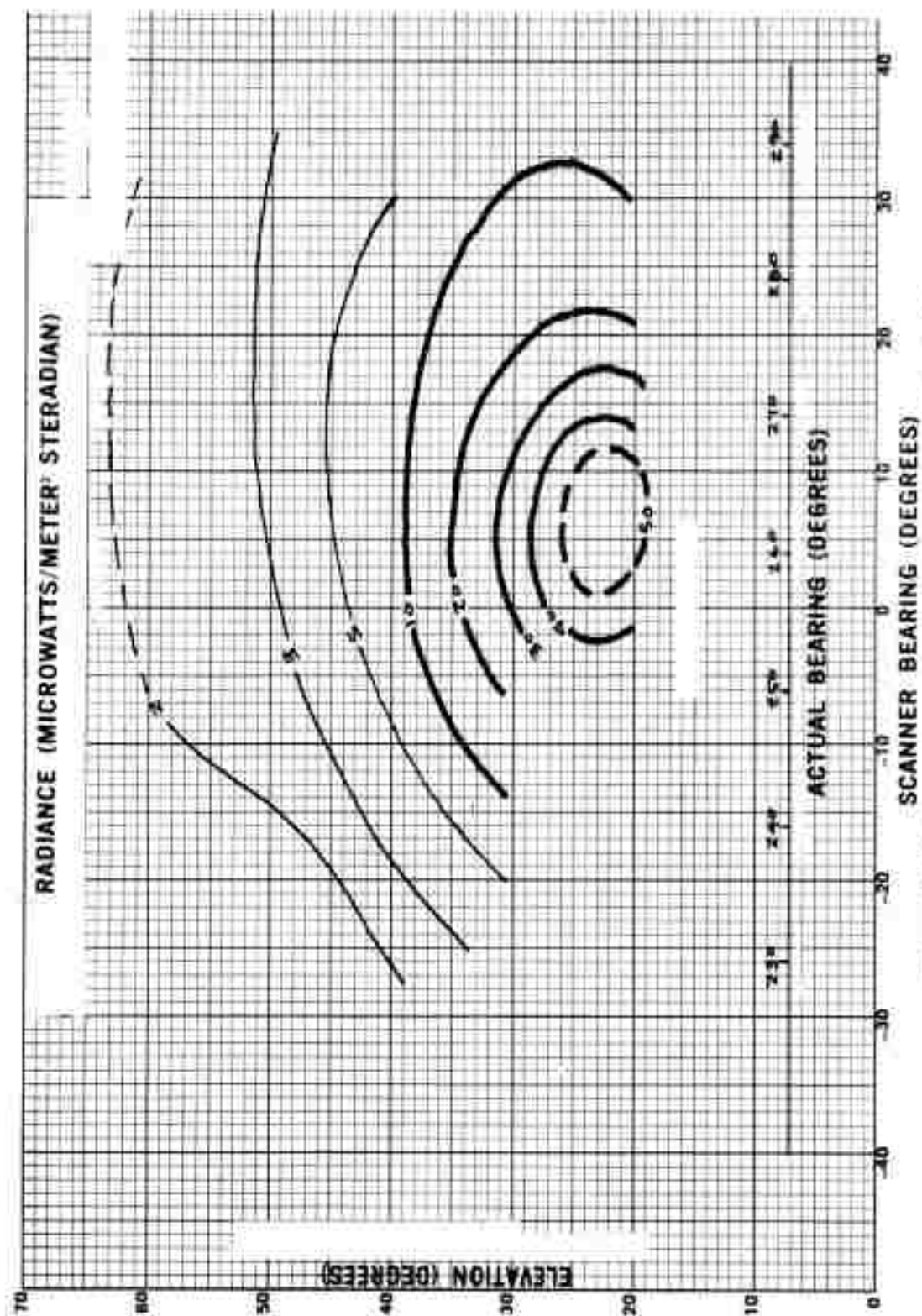


Figure 3.474 Sky radiance, Kottlo I, King Fish, 0.420 to 0.456 micron, H + 661 sec.

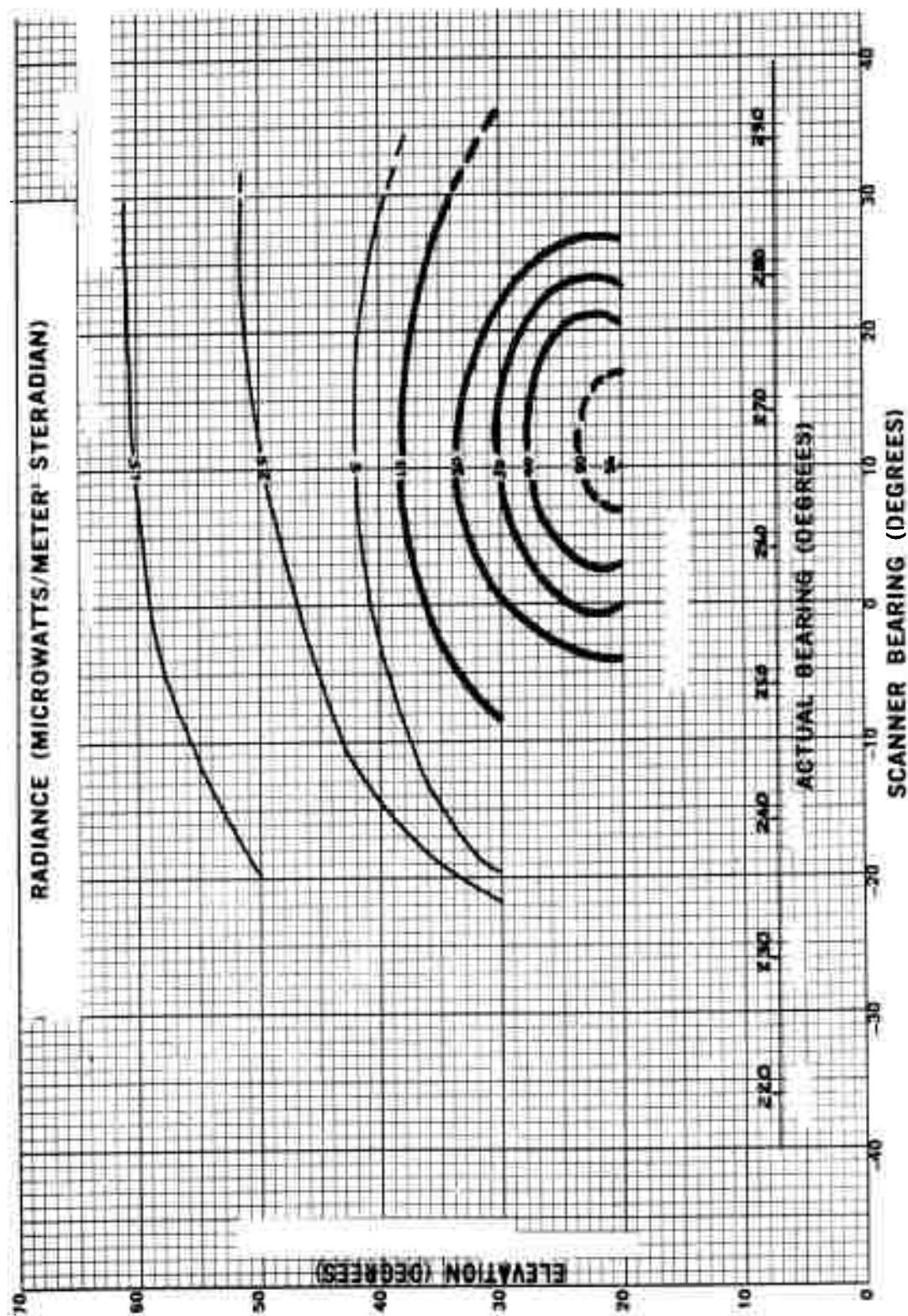


Figure 3.475 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 729 sec.

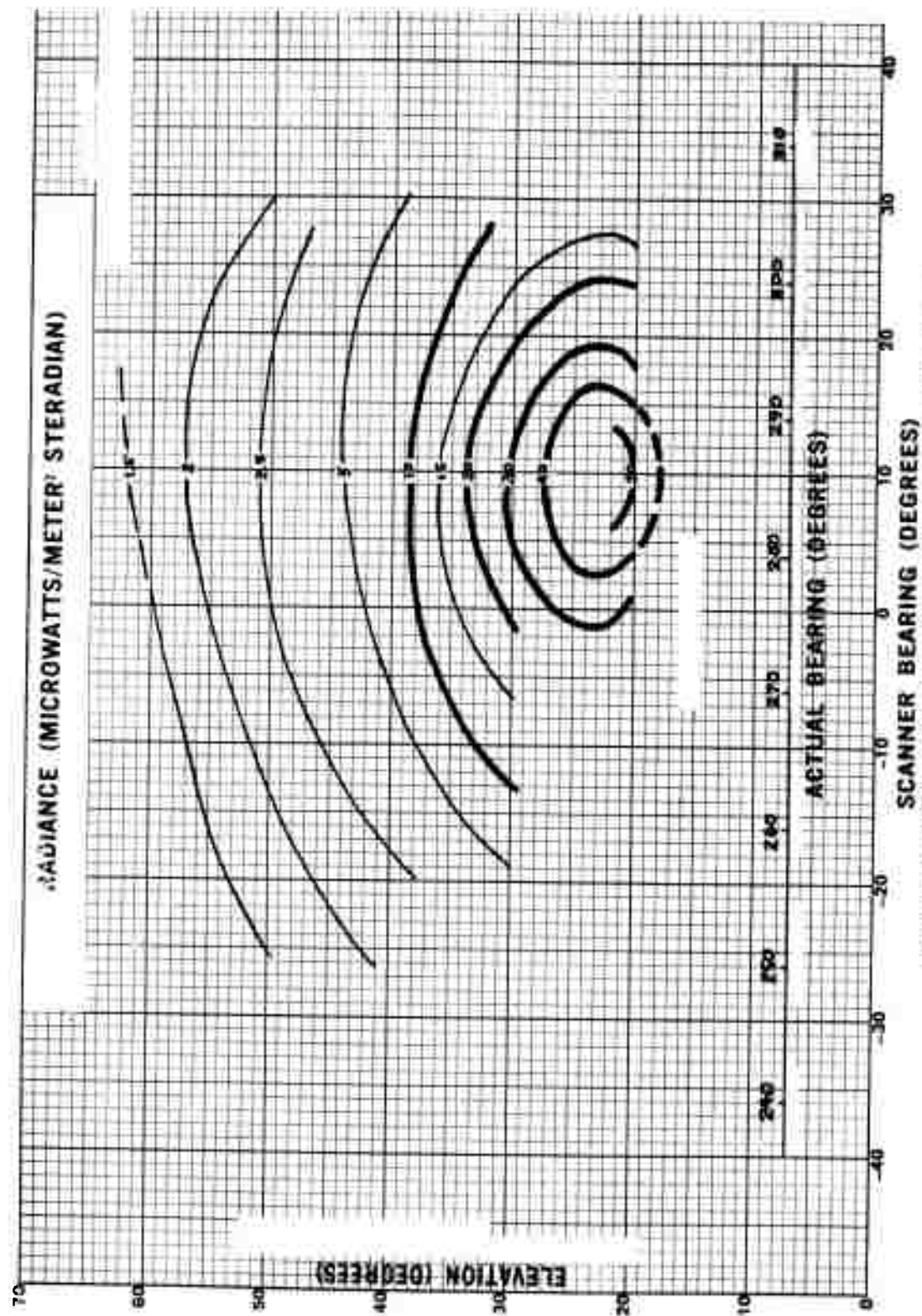


Figure 3.476 Sky radiance, Kottia I, King Fish, 0.420 to 0.466 micron, H = 884 sec.

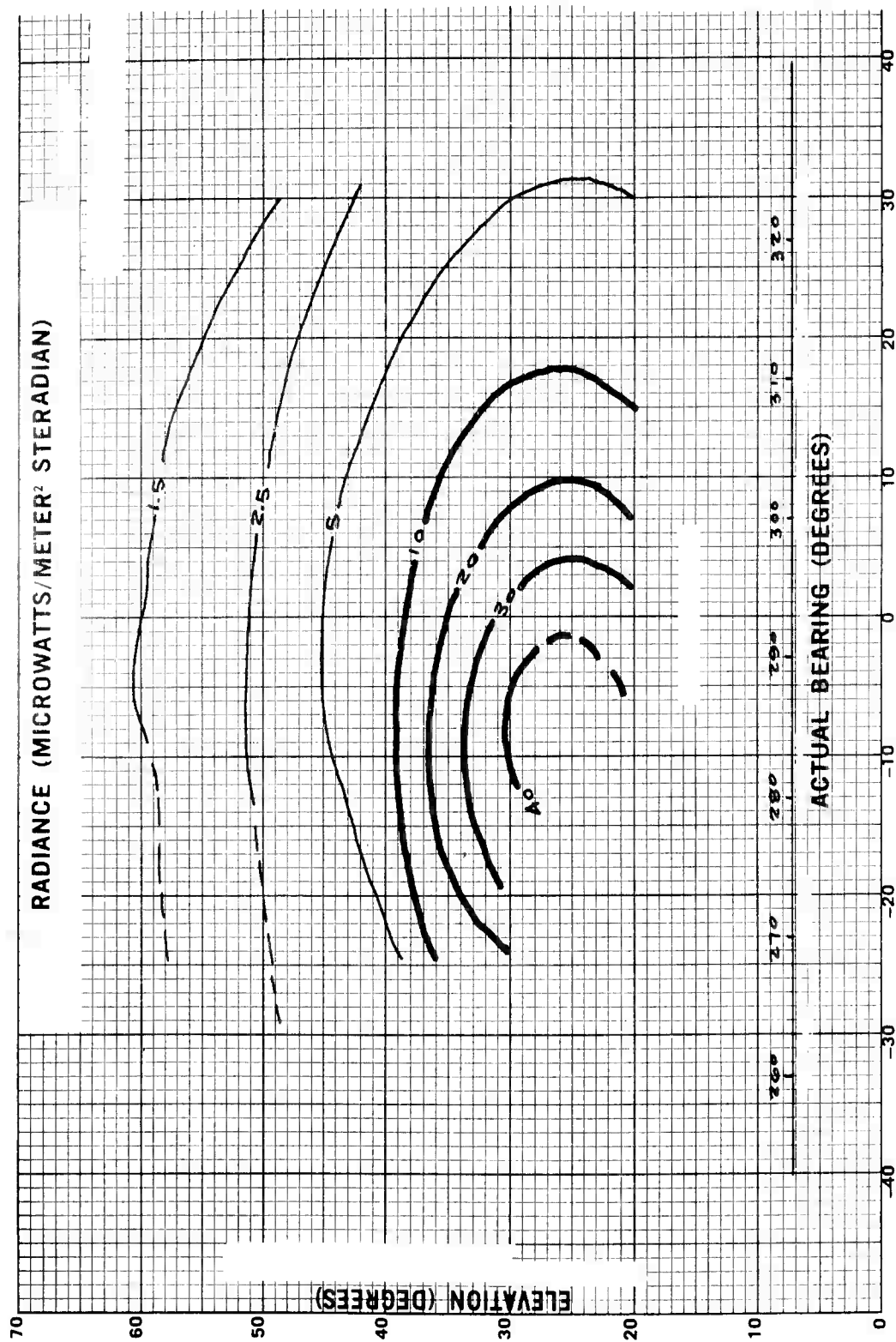


Figure 3.477 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 999 sec.

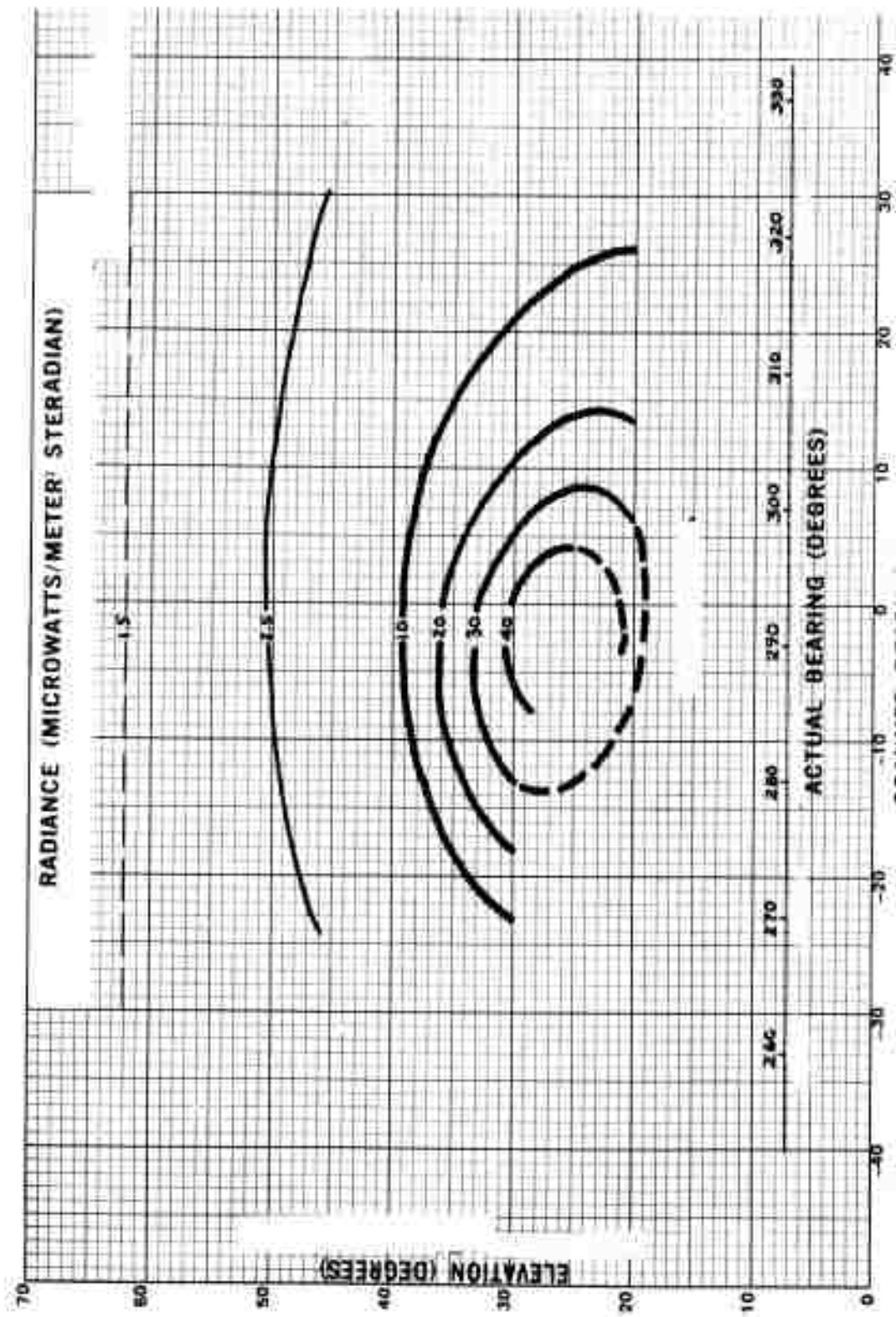


Figure 3.478 Sky radiance, Kettle 1, King Field, 0.420 to 0.456 micron, H + 1.067 sec.

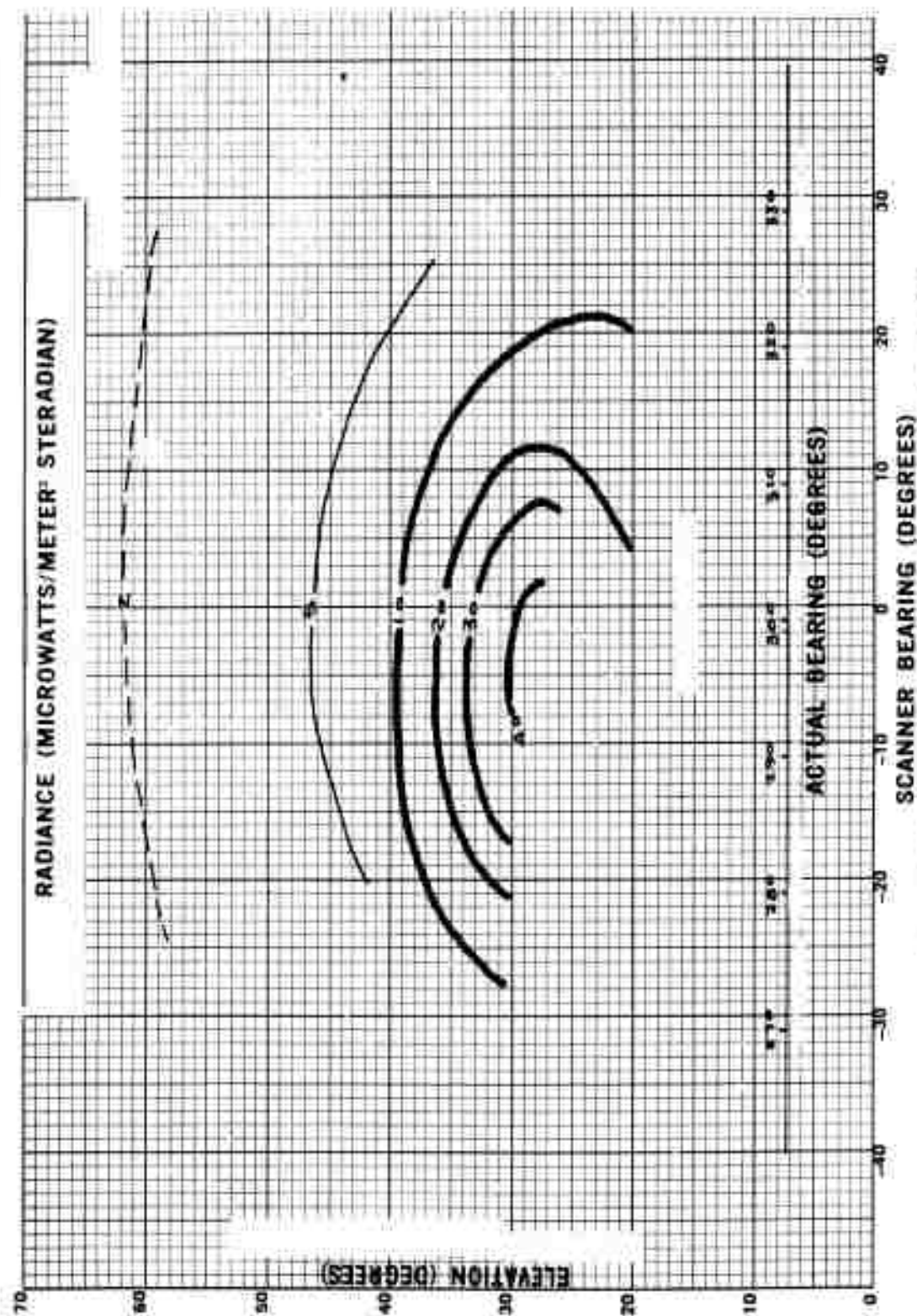


Figure 3-479 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H+1.135 sec.

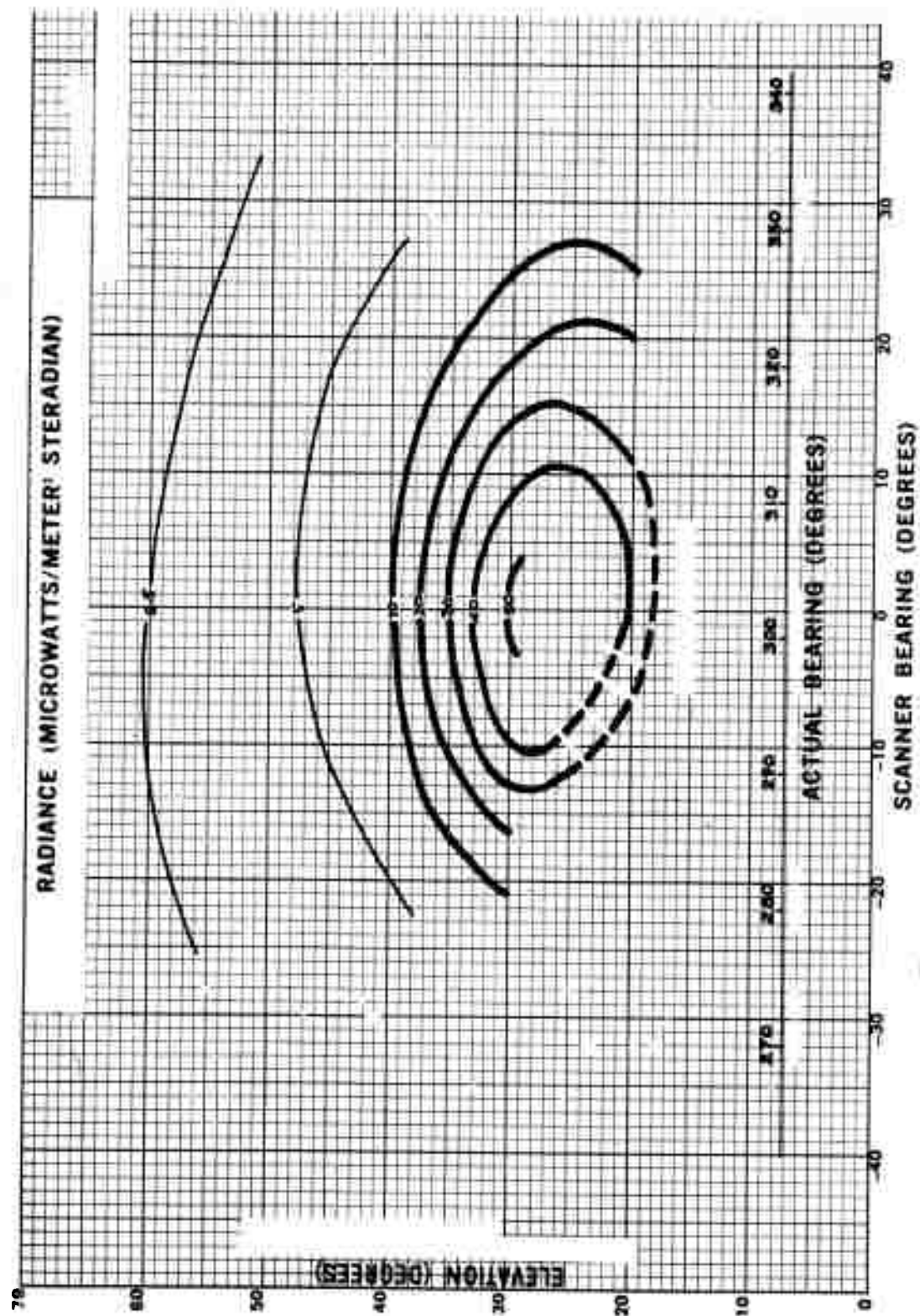


Figure 3-480 Sky radiance, Kettle I, King Fish, 0.420 to 0.458 micron, H + 1,203 sec.

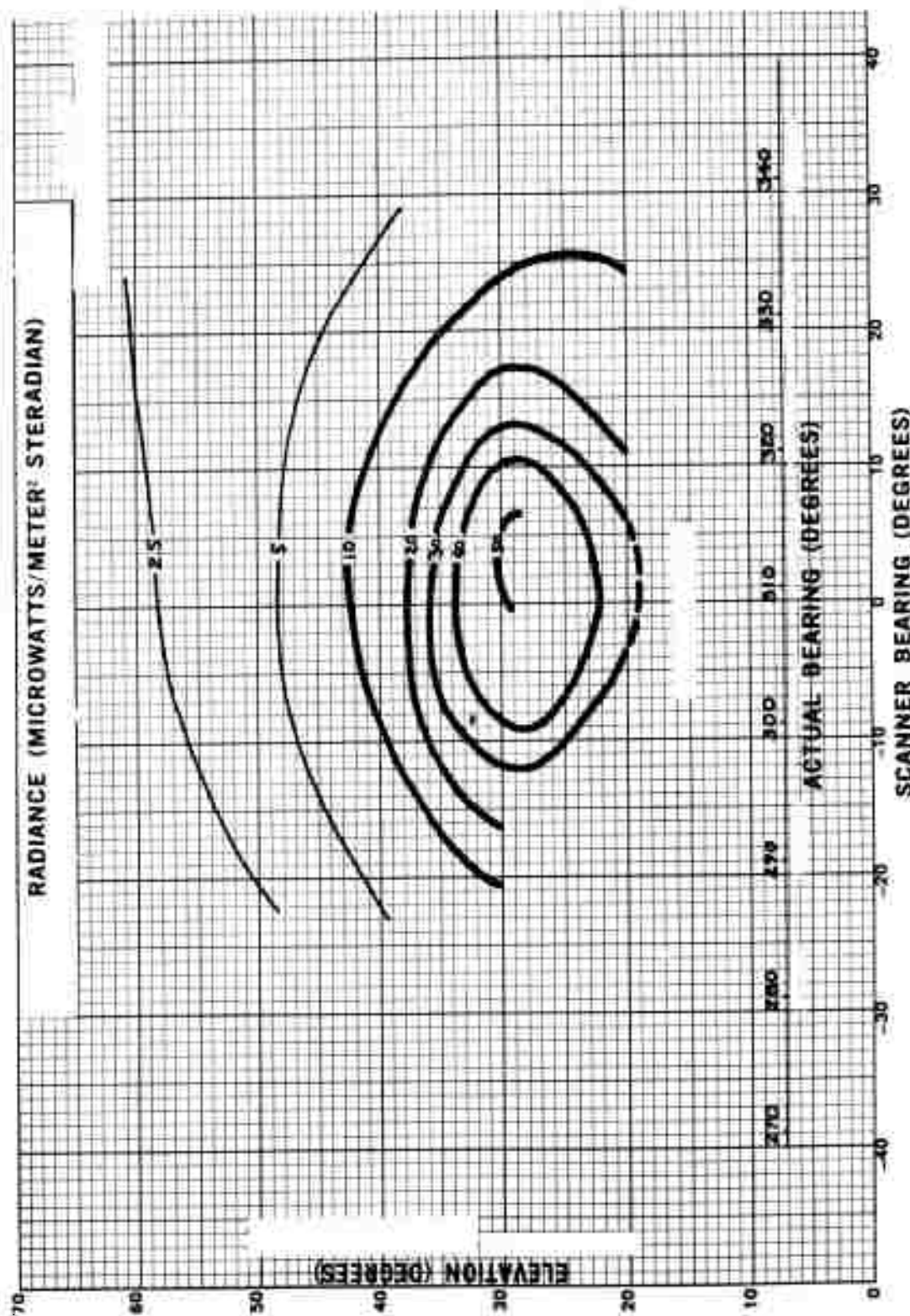


Figure 3-481 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H+1.270 sec.

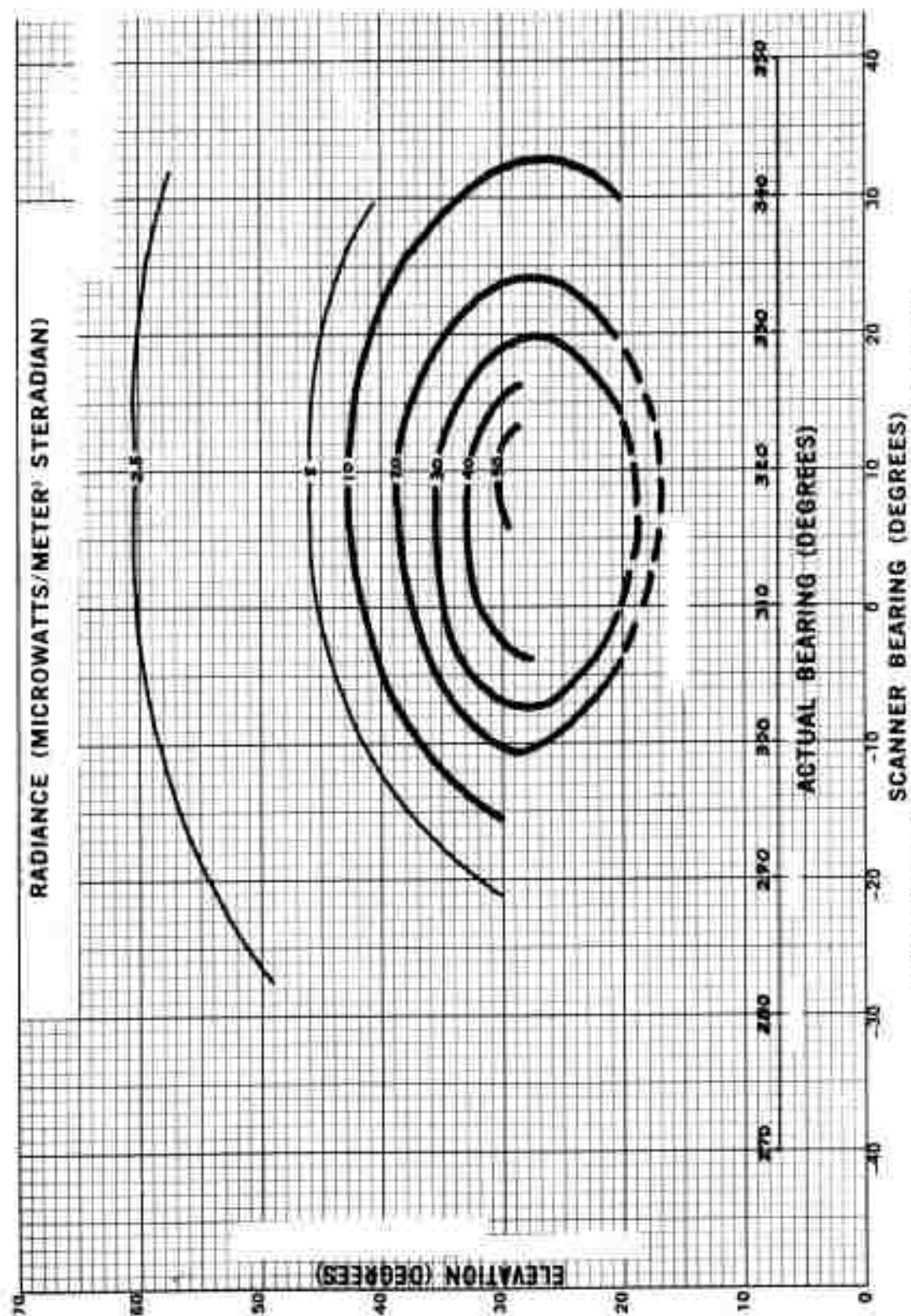


Figure 3.452 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 1.338 sec.

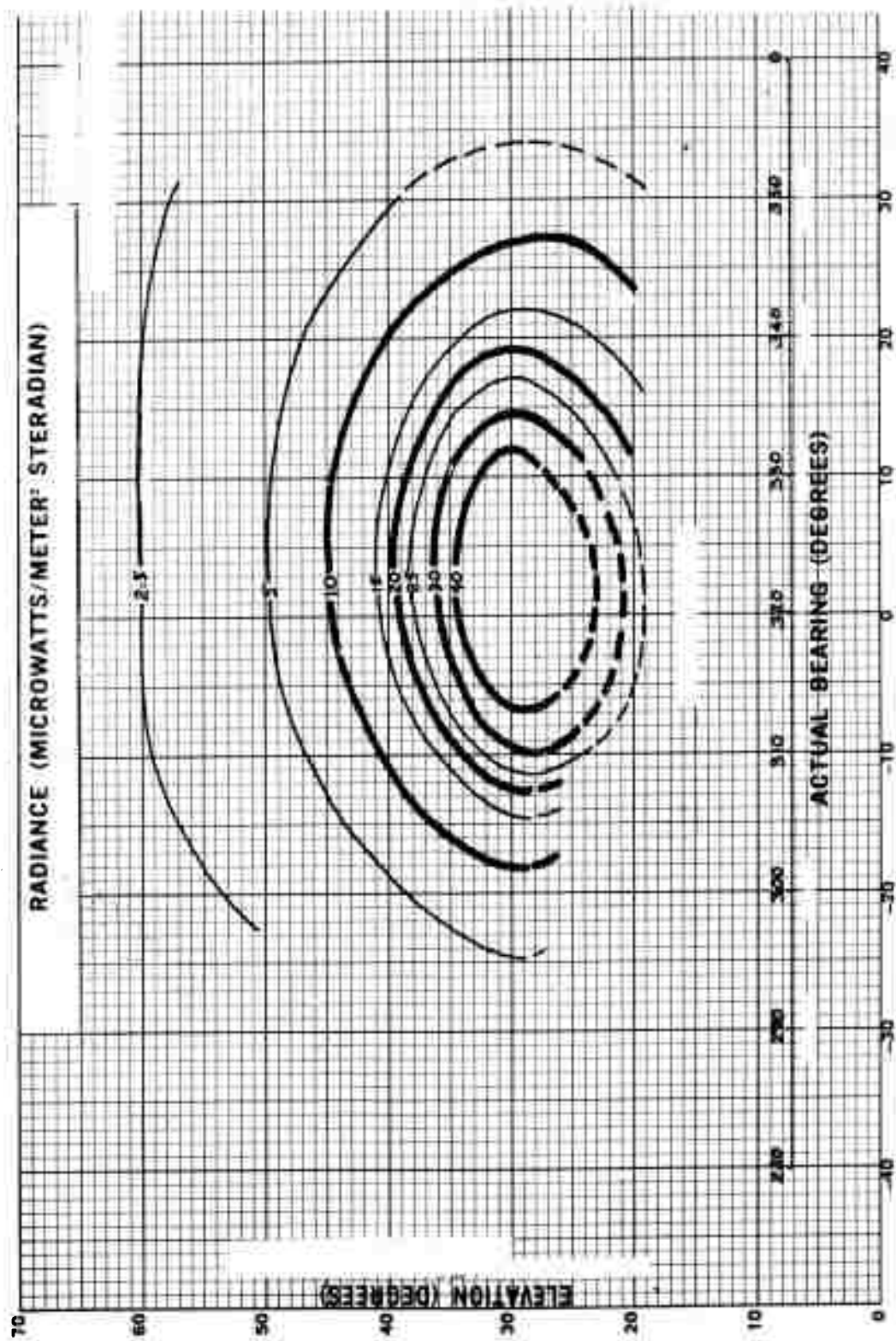


Figure 3.450 Sky radiance, Kettle I, King Fish, 0.430 to 0.456 micron, H + 1,406 sec.

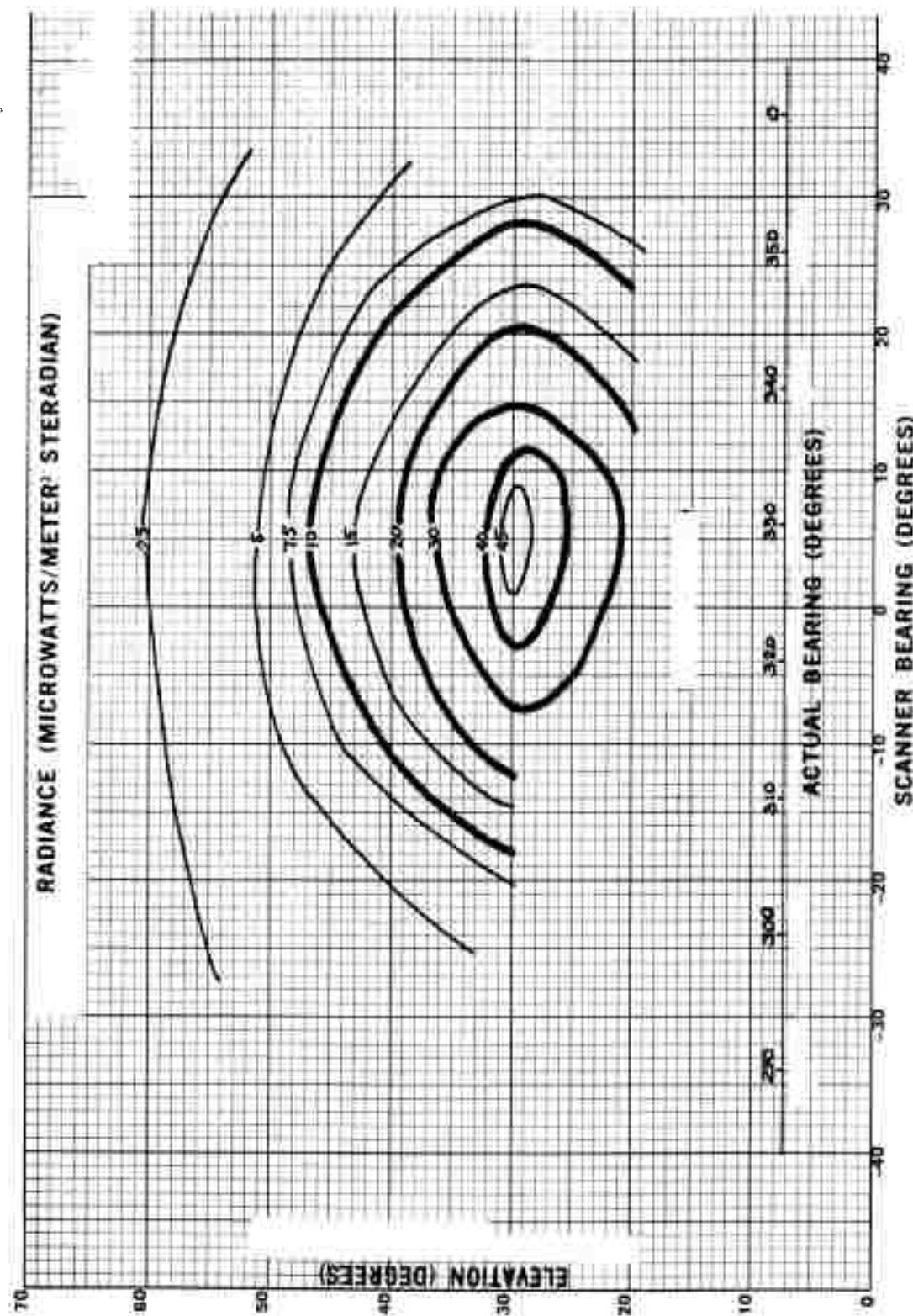


Figure 3.454 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 1.474 sec.

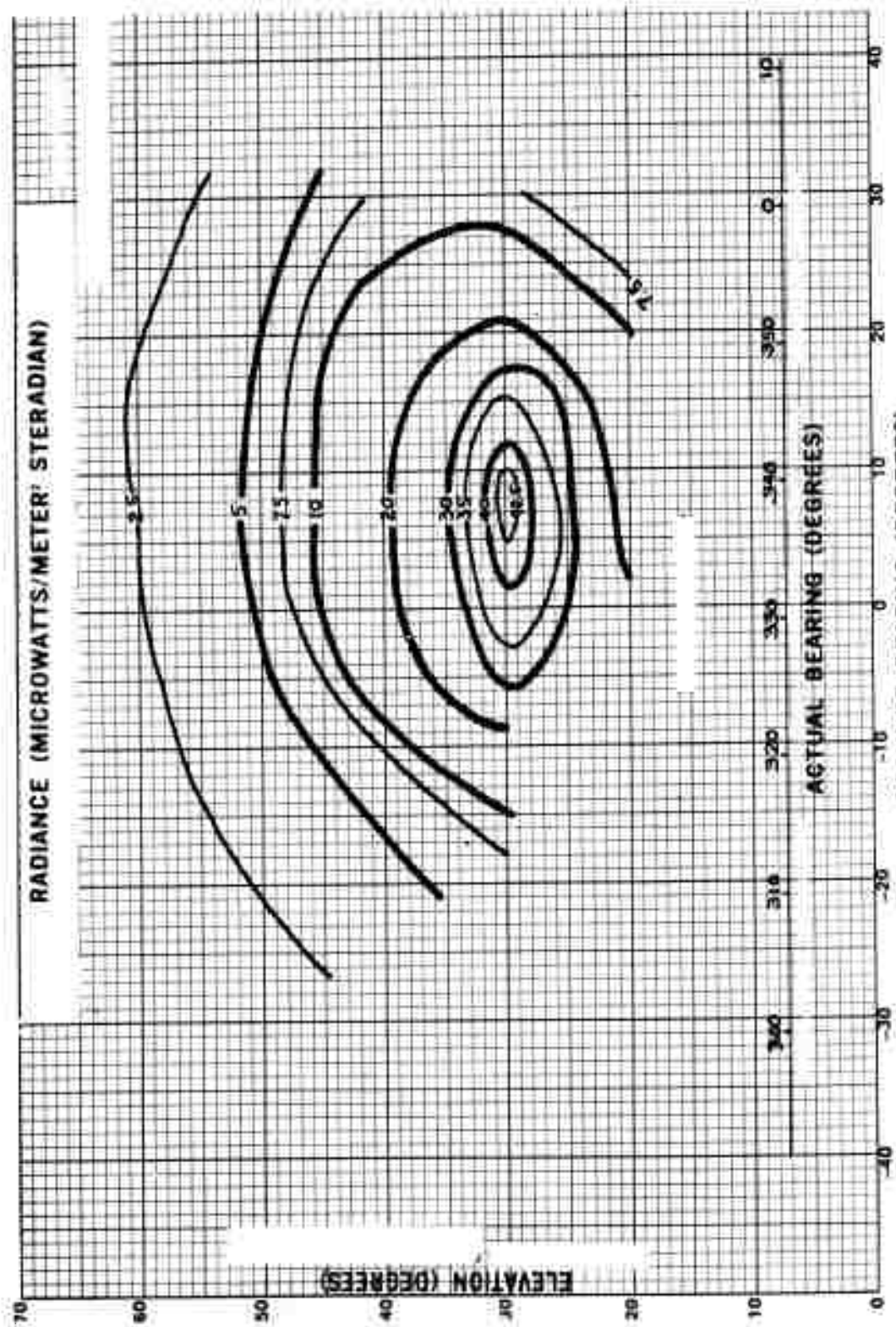


Figure 3.480 Sky radiance, Kattle I, King Fish, 0.420 to 0.456 micron, H = 1.541 sec.

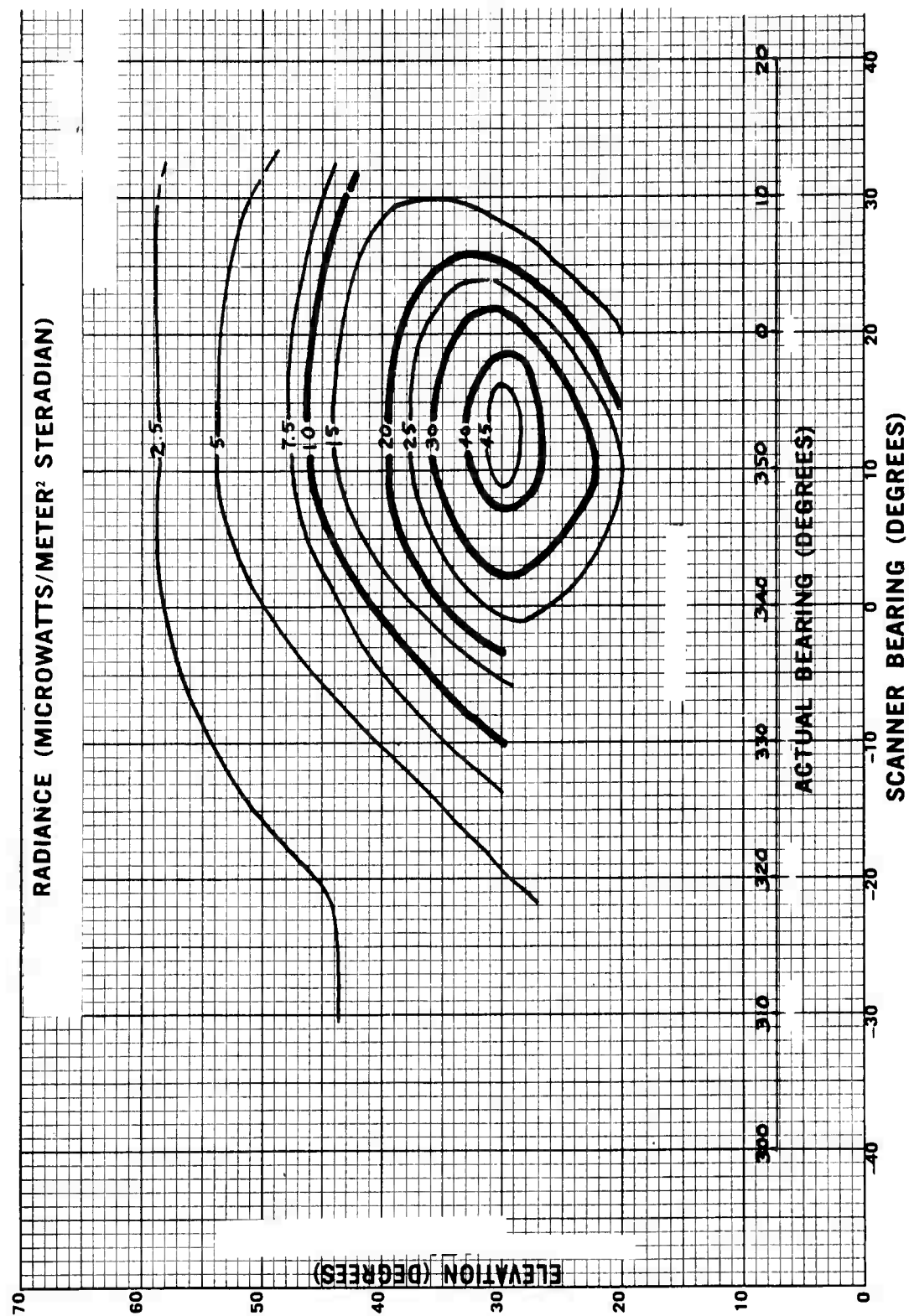


Figure 3.486 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 1,677 sec.

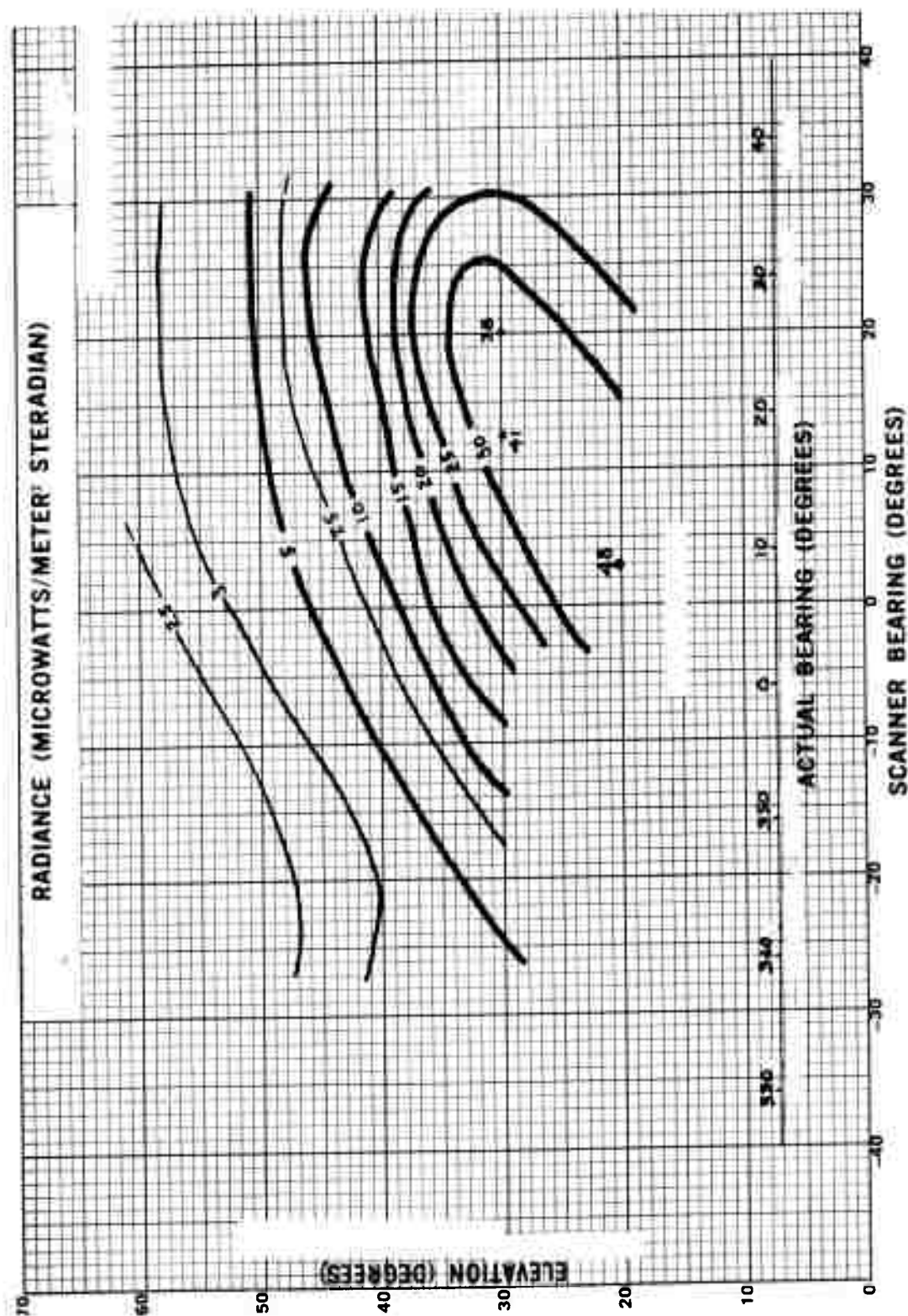


Figure 3-487 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H+1.948 sec.

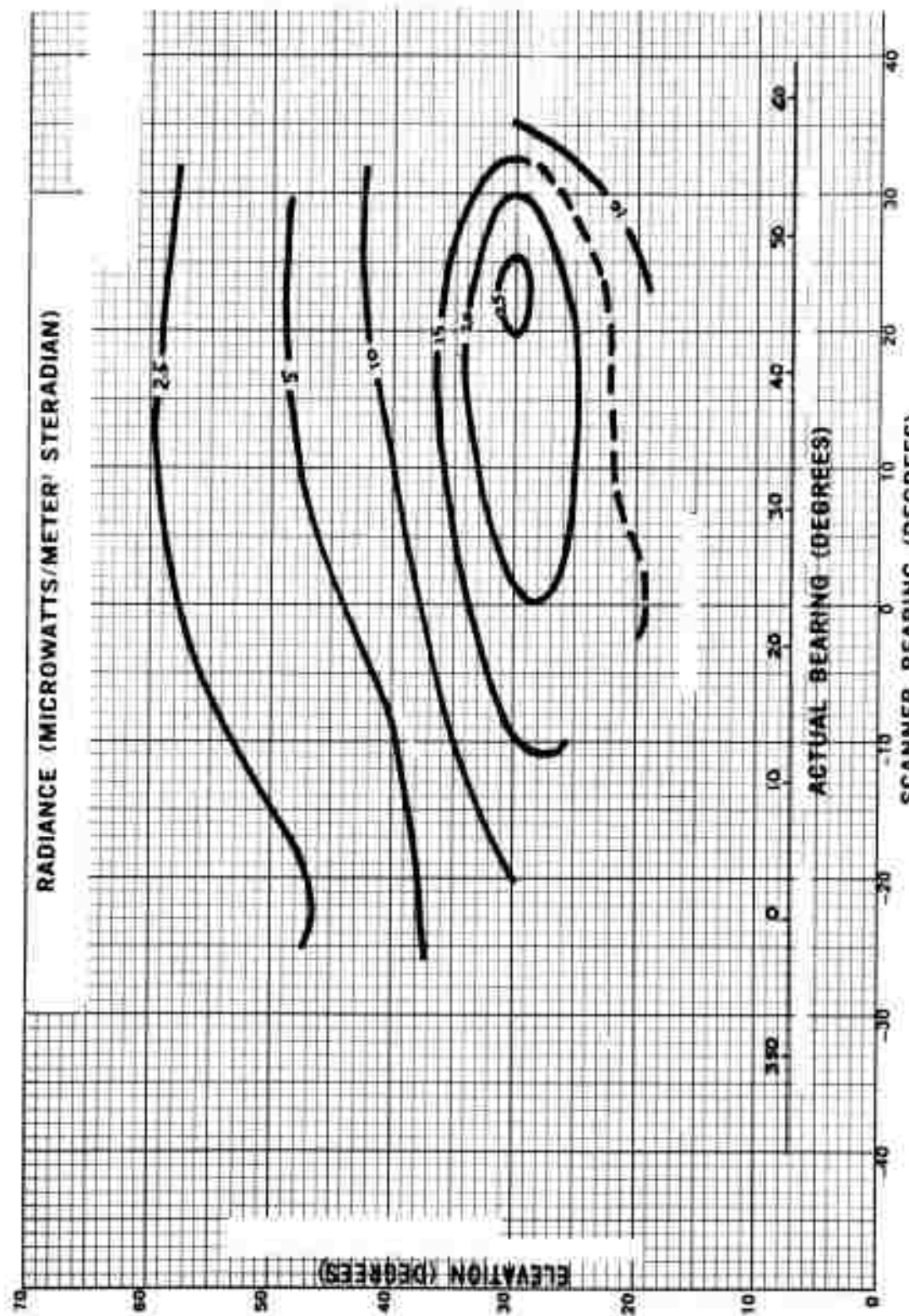


Figure 3.488 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 2.084 sec.

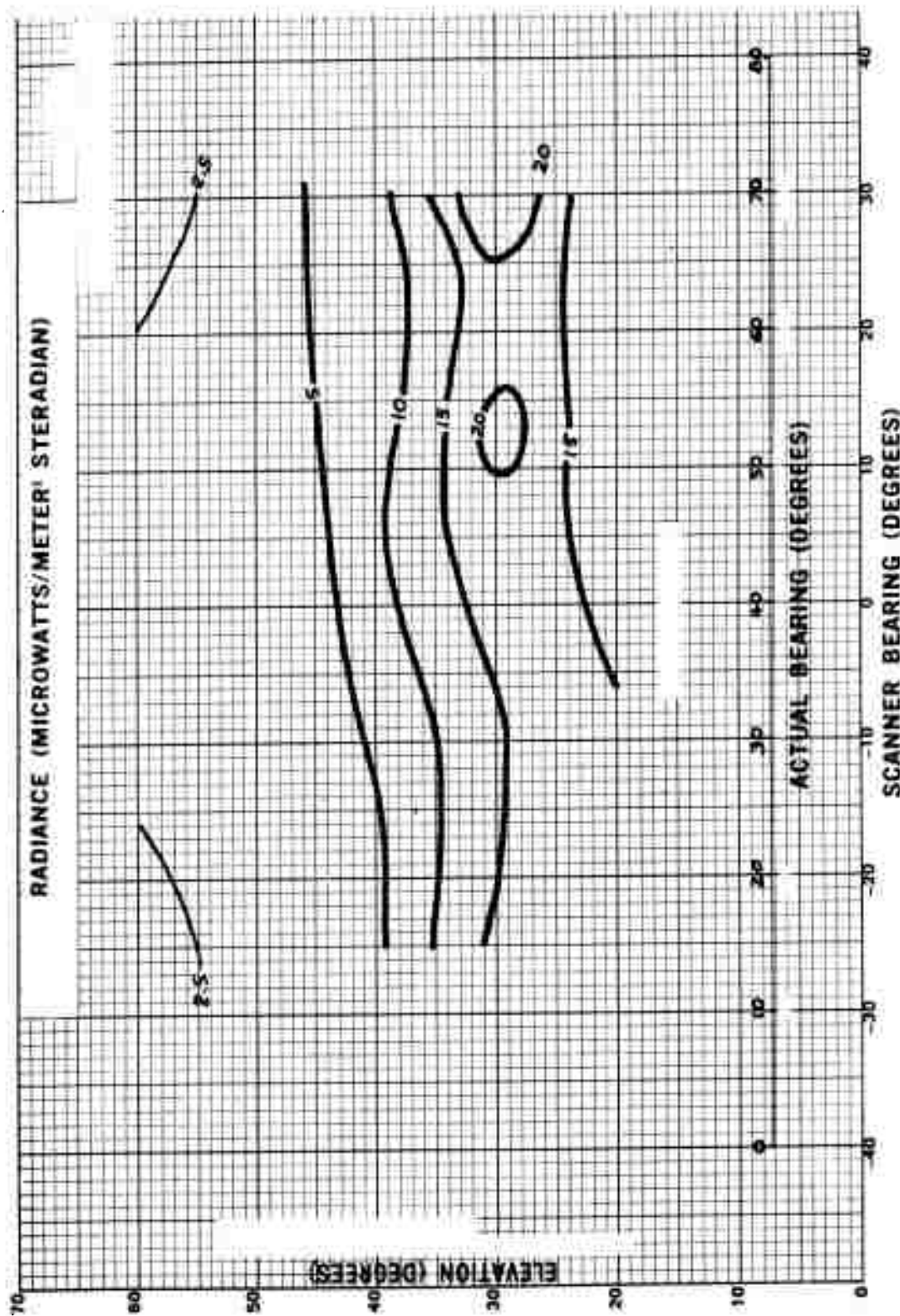


Figure 3.459 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, $H = 2,257$ m.

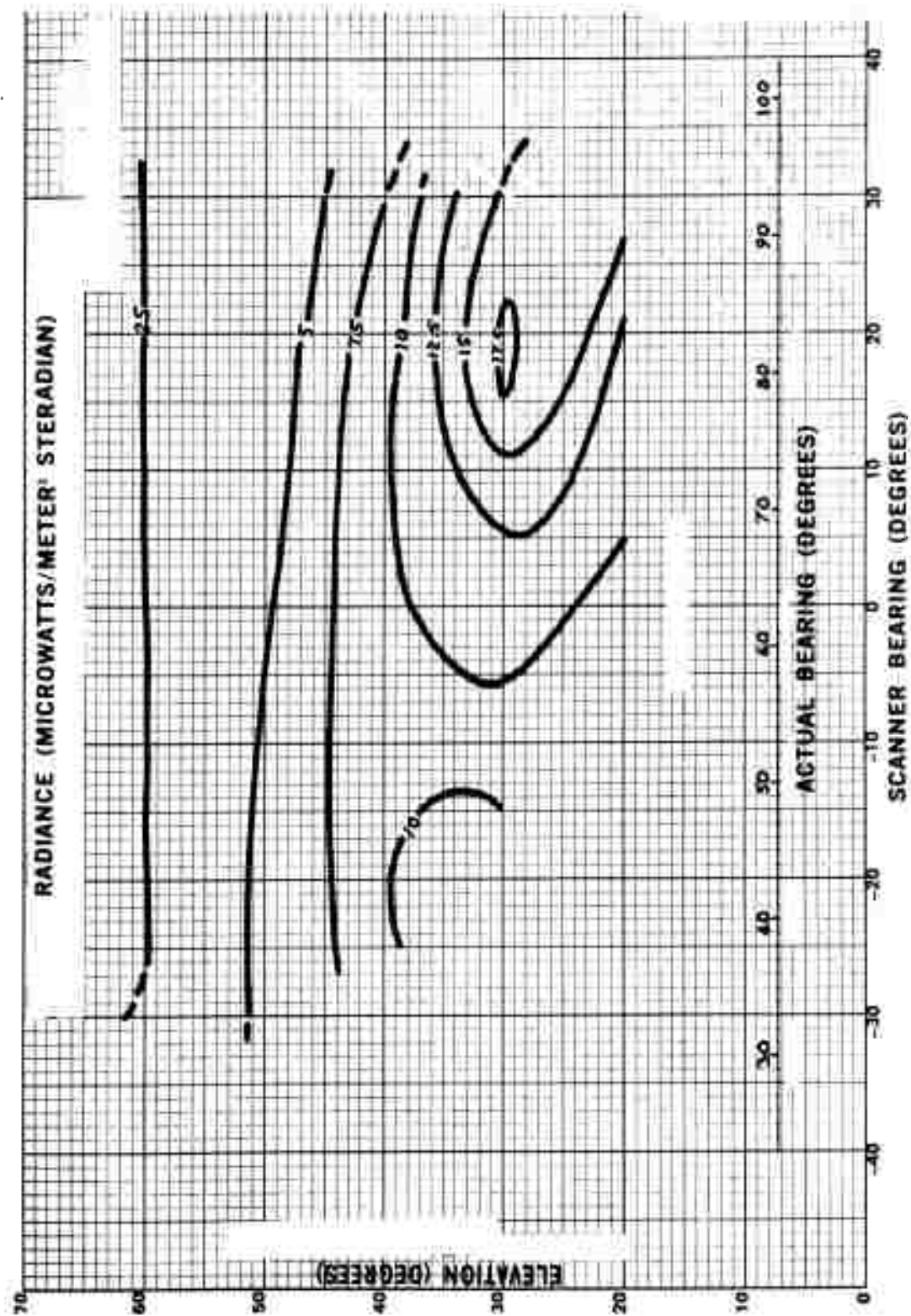


Figure 3.490 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 2,558 sec.

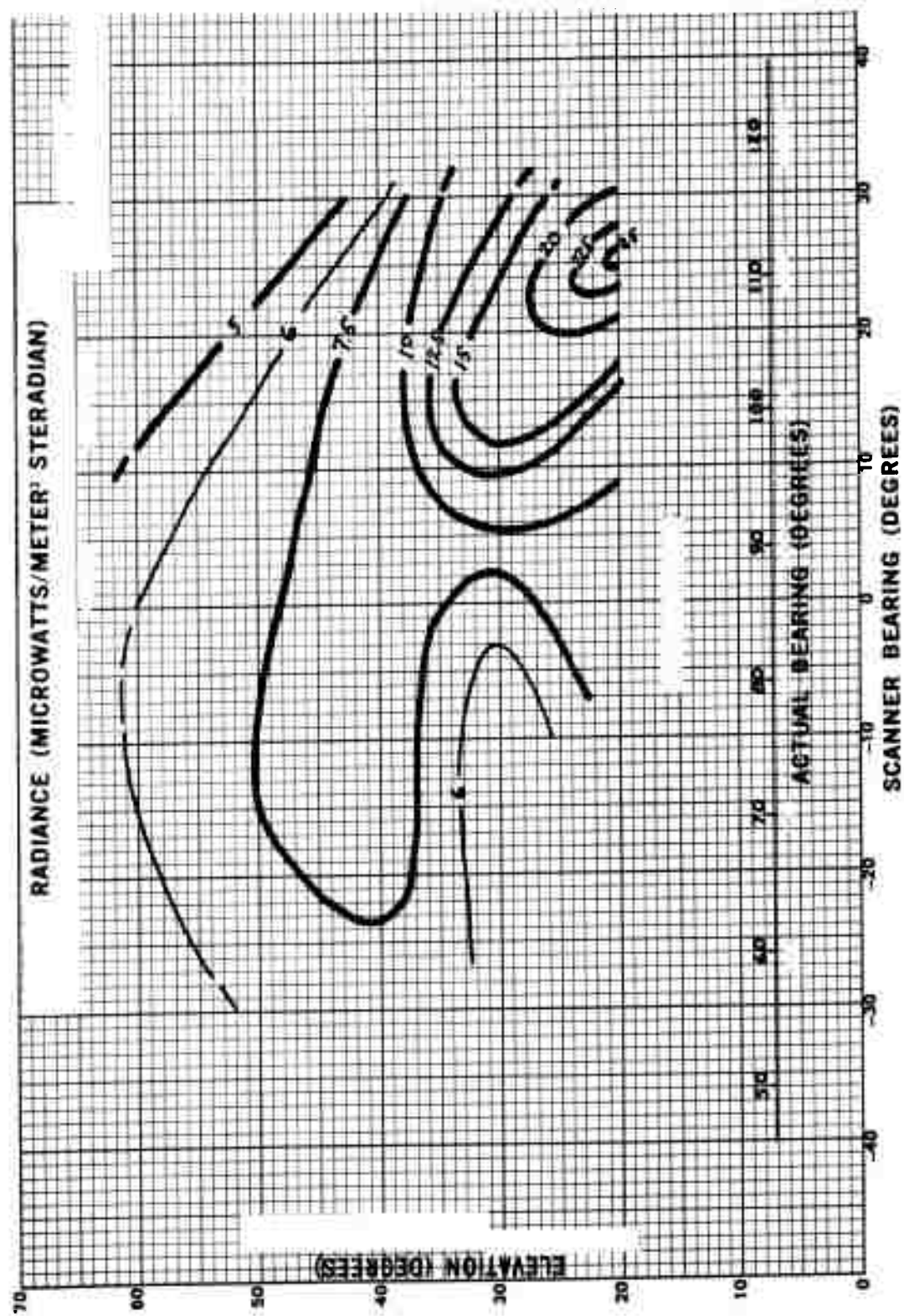


Figure 3.491 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 2,762 sec.

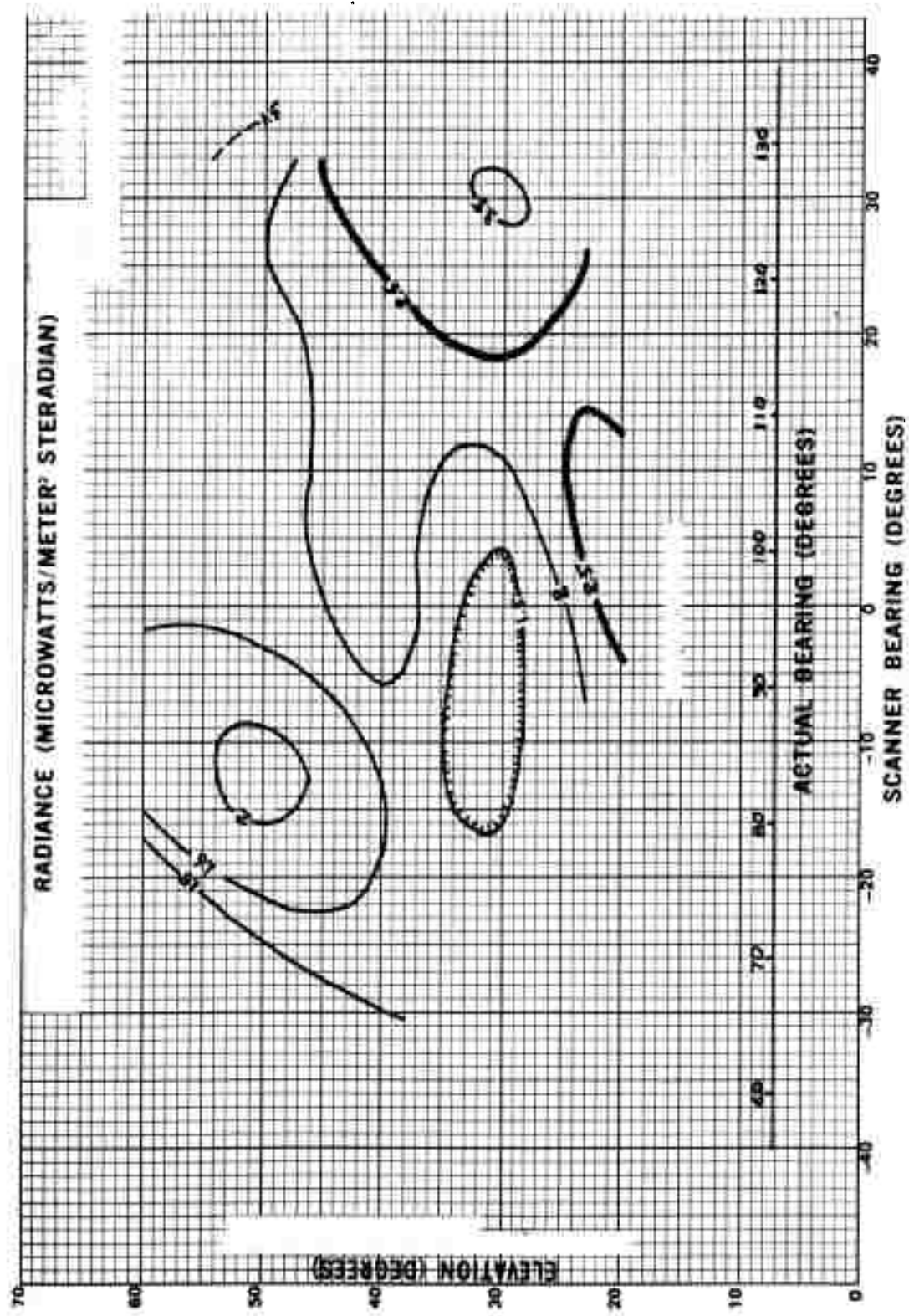


Figure 3.492 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 2,897 sec.

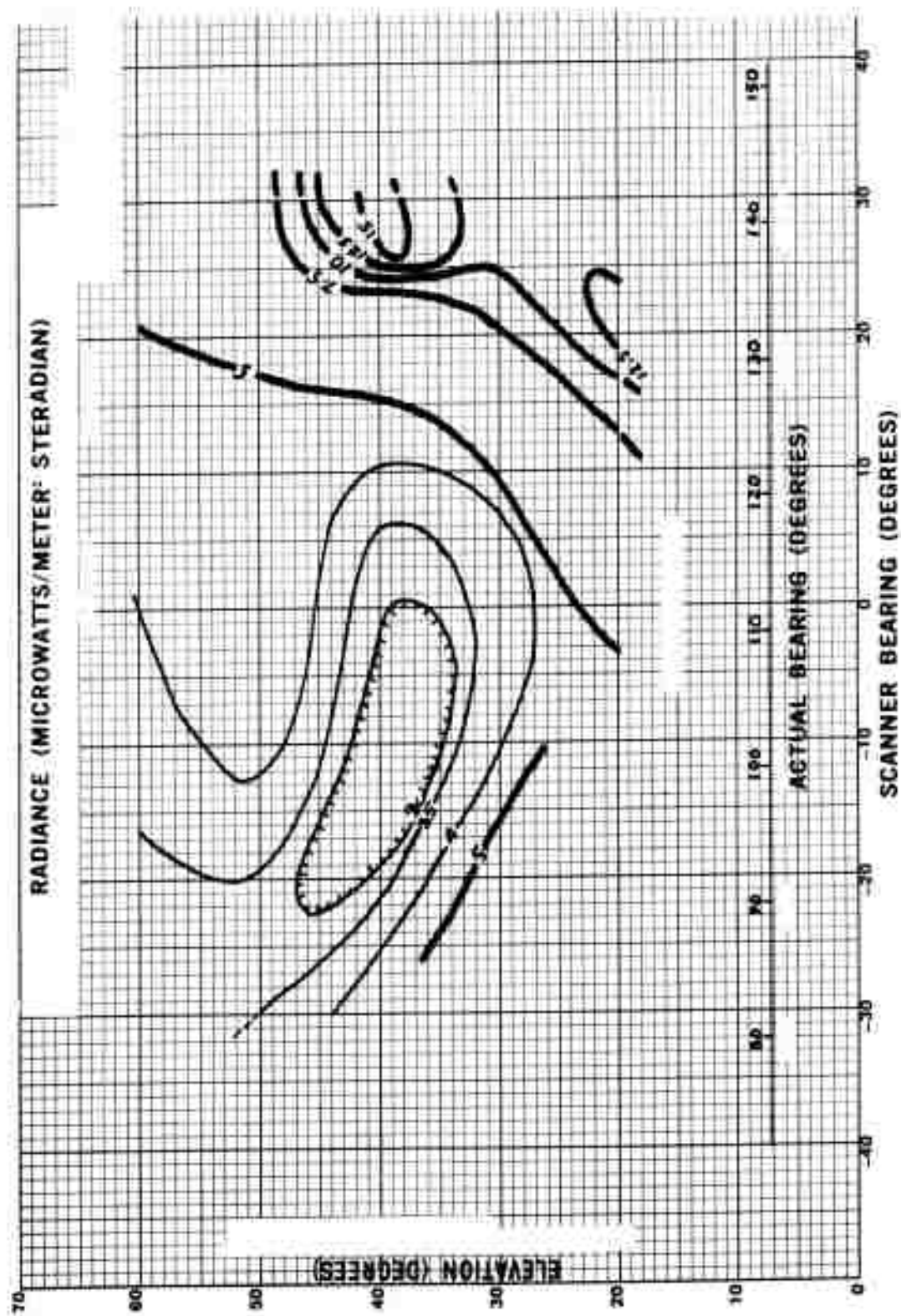


Figure 3.493 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H+3,101 sec.

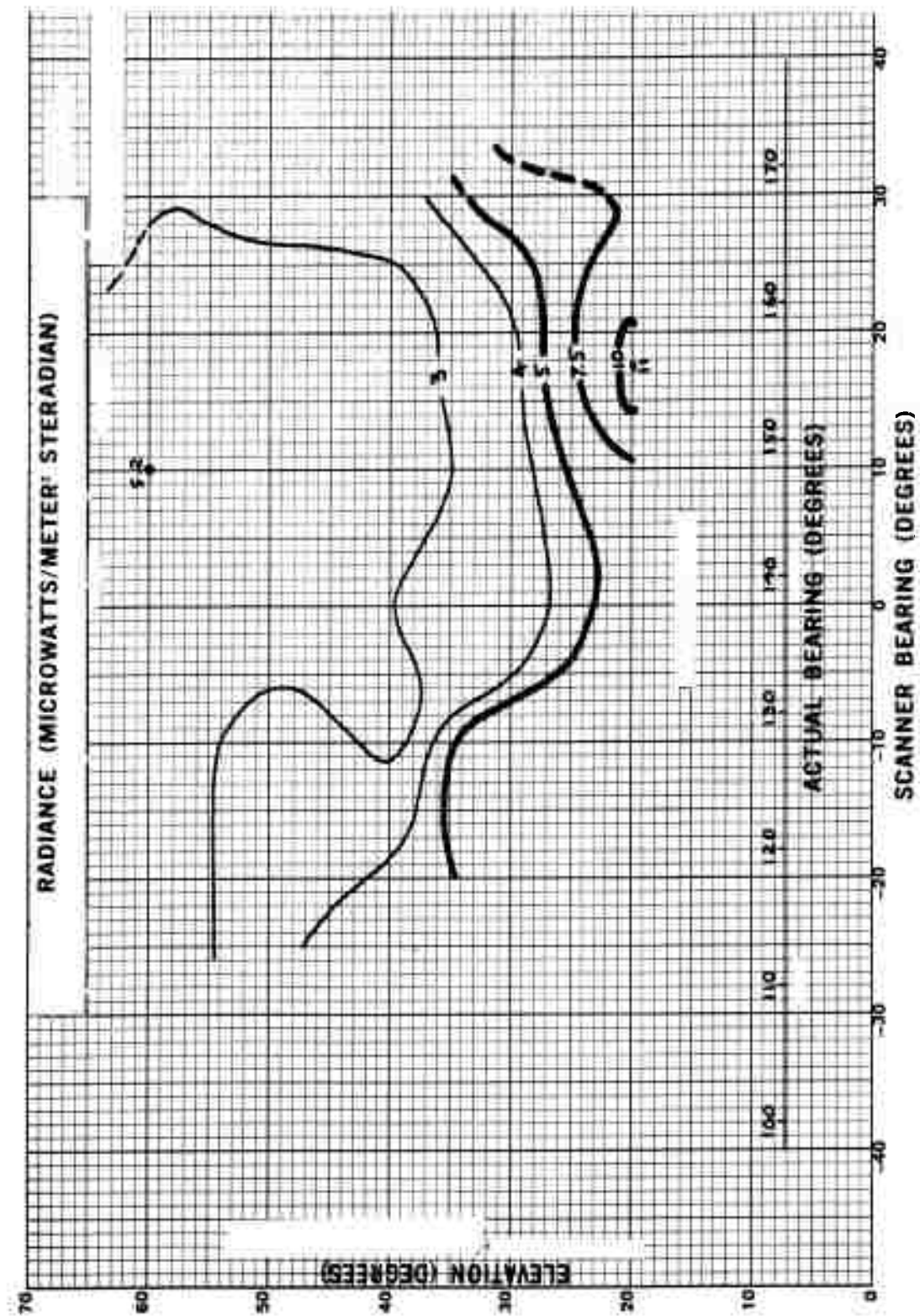


Figure 3.494 Sky radiance, Kettle I, King Fish, 0.420 to 0.456 micron, H + 3,372 sec.

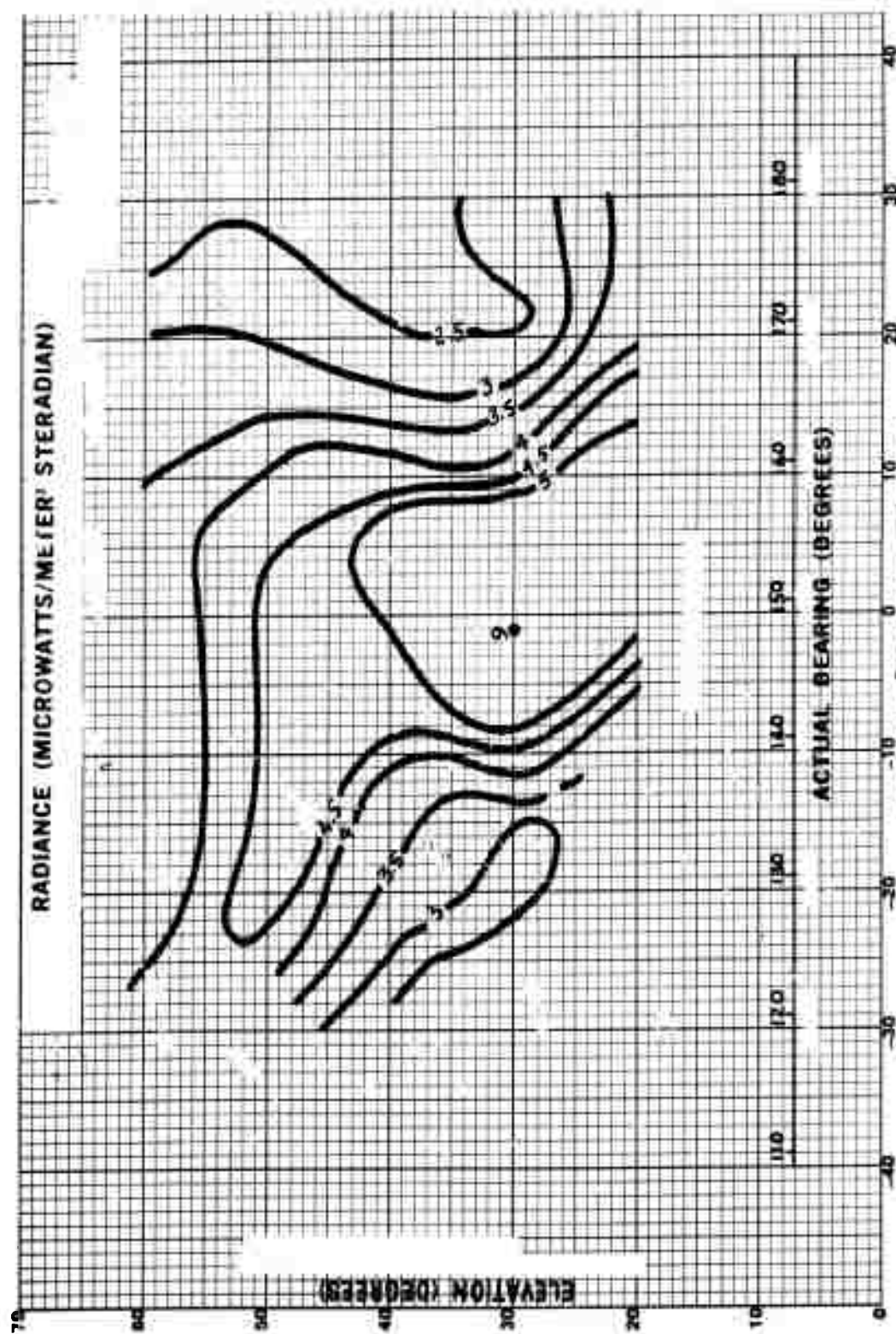


Figure 3.496 Sky radiance, Kettle I, King Fish, 0.430 to 0.456 micron, H + 3.643 sec.

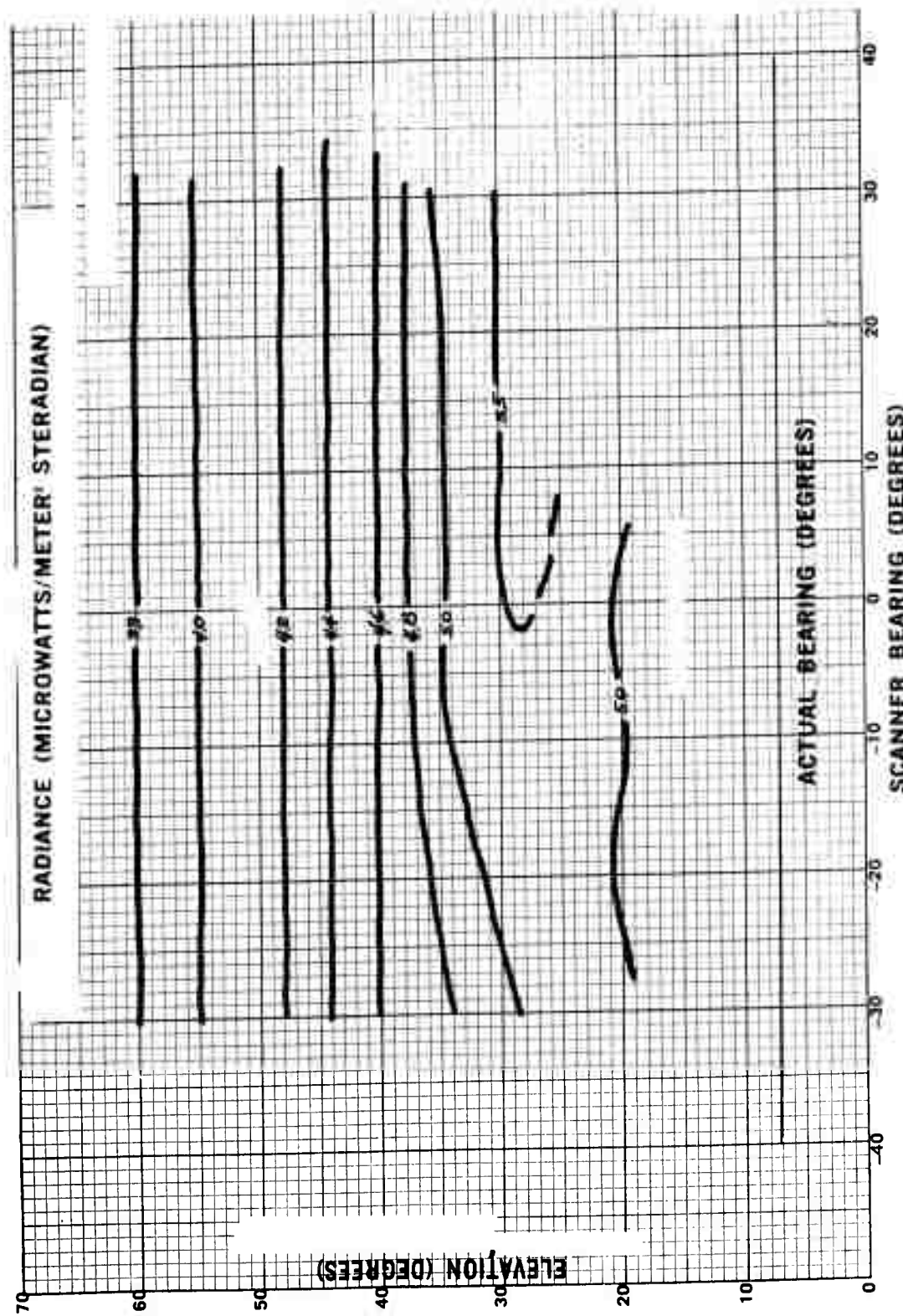


Figure 3.407 Sky radiance, Kettle I, King Fish, 0.356 to 0.558 micron, H-270 elec.

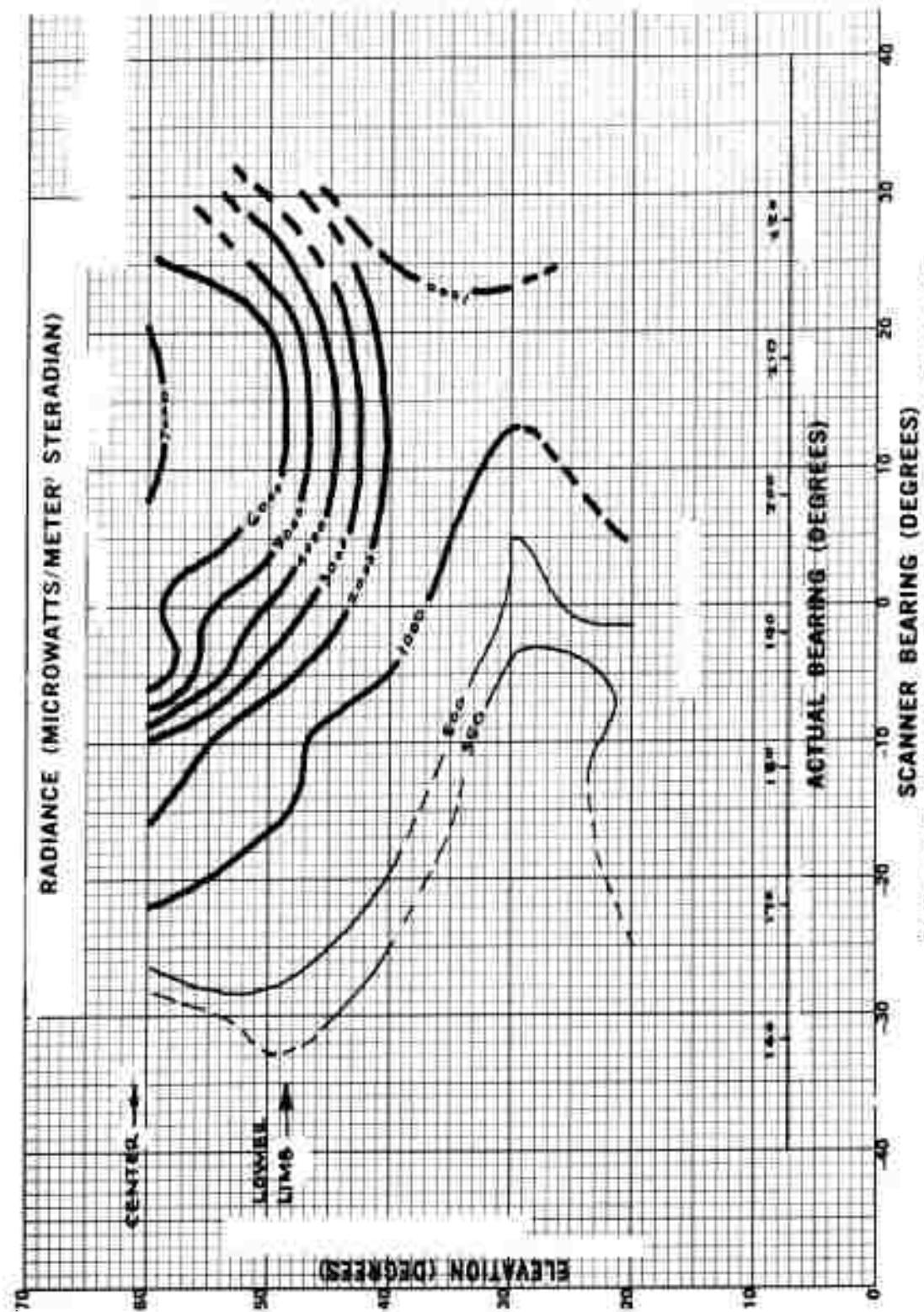


Figure 3.498 Sky radiance, Kettle I, King Feb, 0.358 to 0.508 micron, H+64 sec.

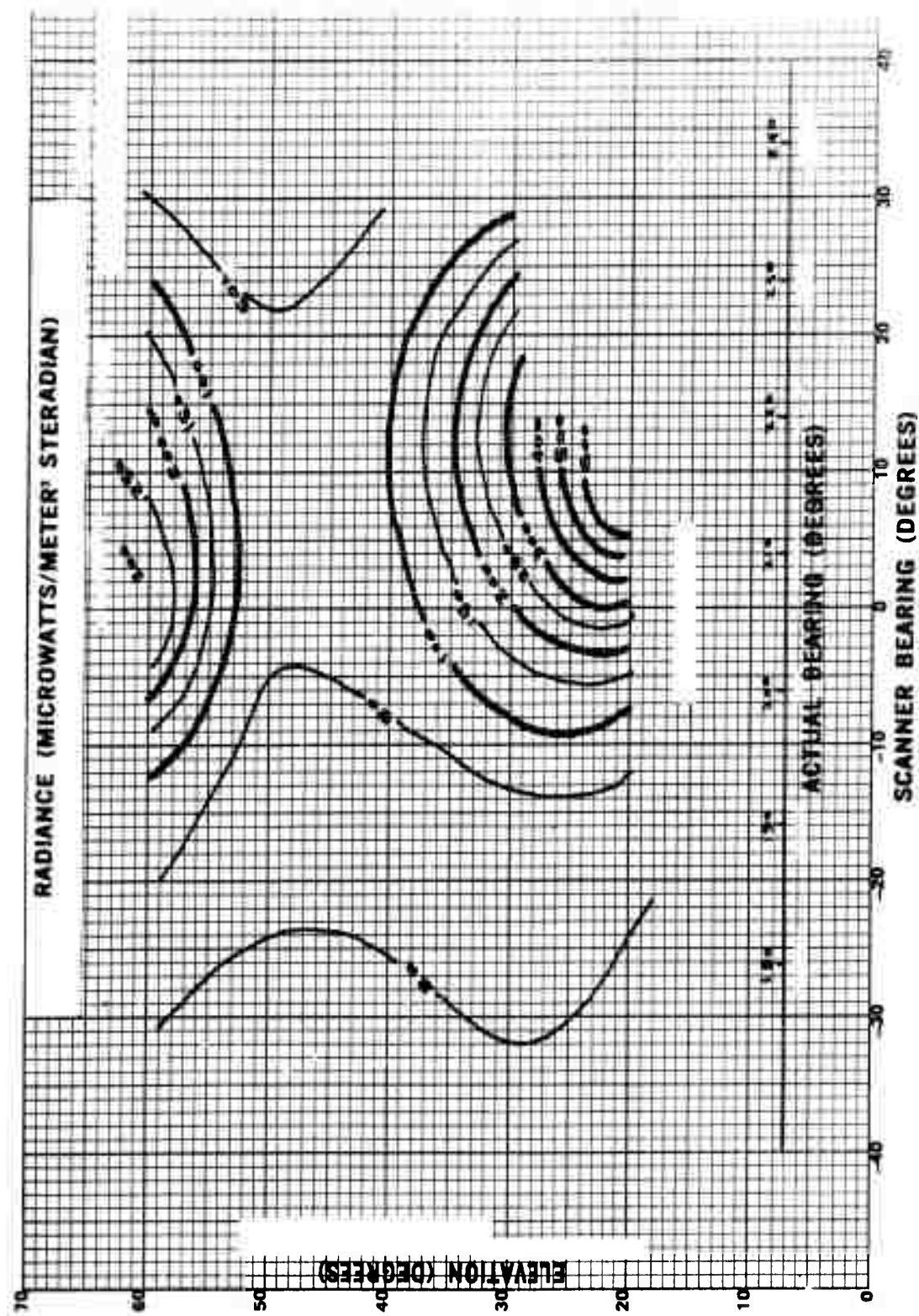


Figure 3.500 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H+199 sec.

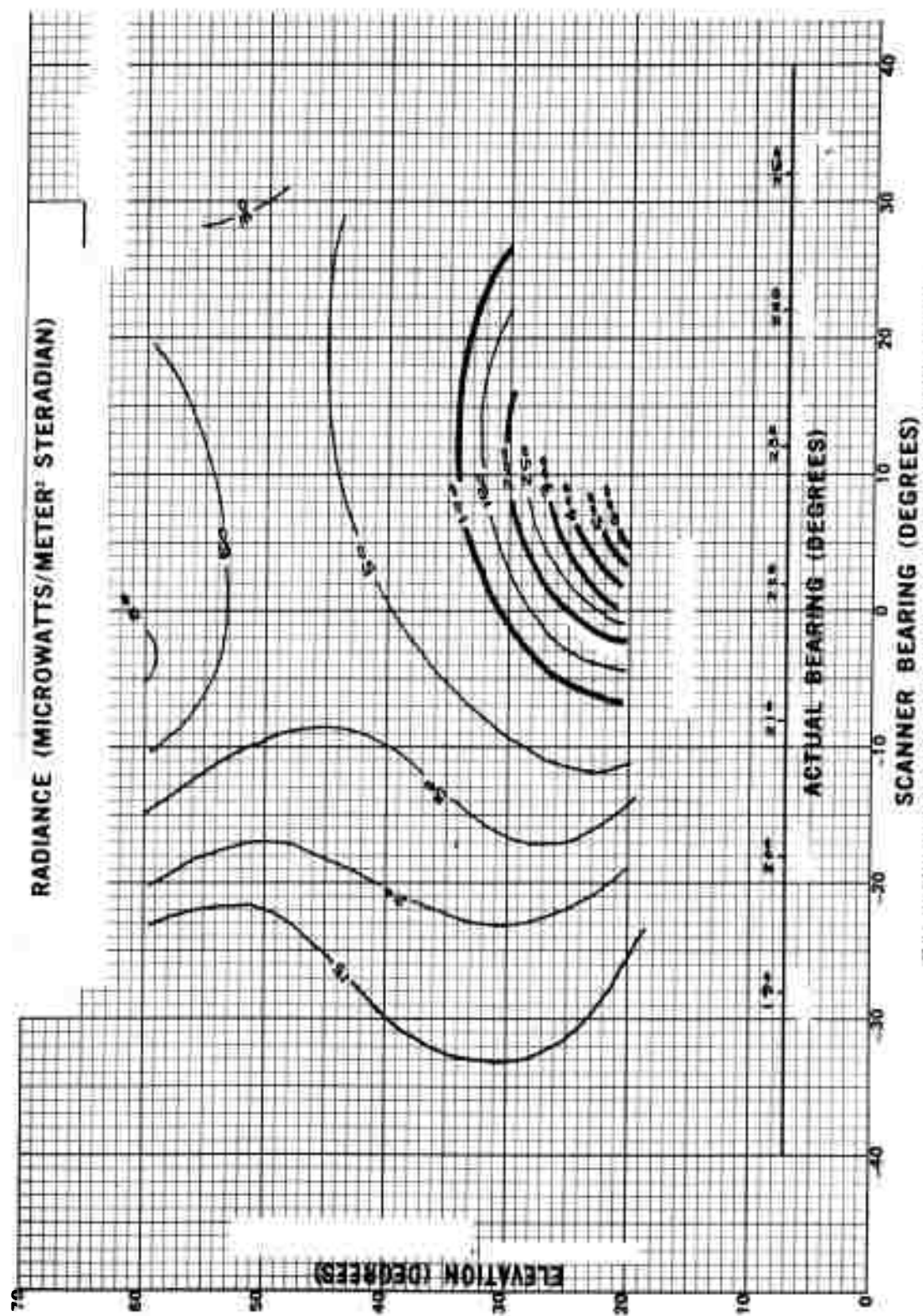


Figure 3.562 Sky radiance, Kettle I, King Fish, 0.558 to 0.588 micron, H = 334 sec.

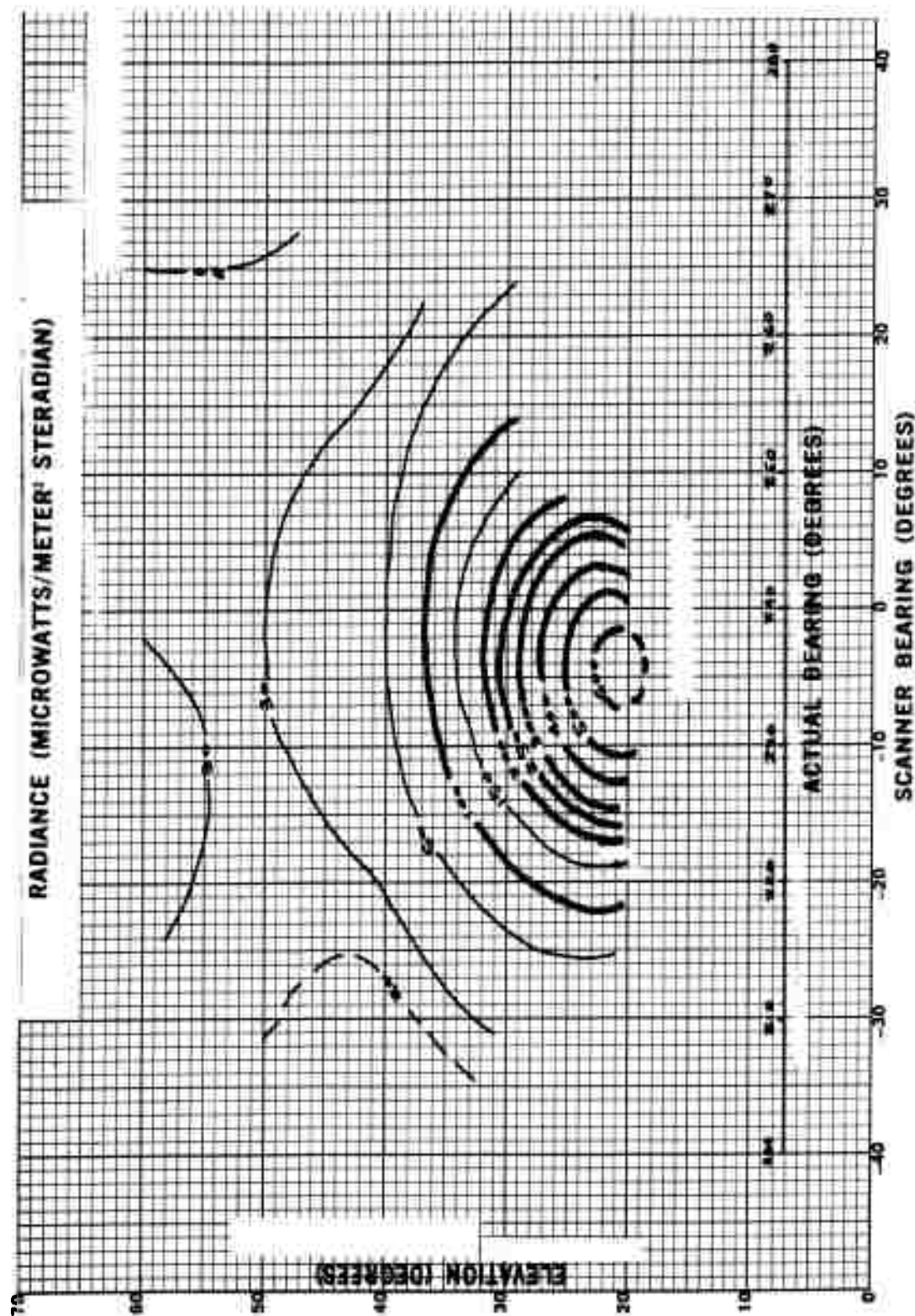


Figure 3.503 Sky radiance, Kettle 1, King Flab, 0.358 to 0.558 micron, H + 402 sec.

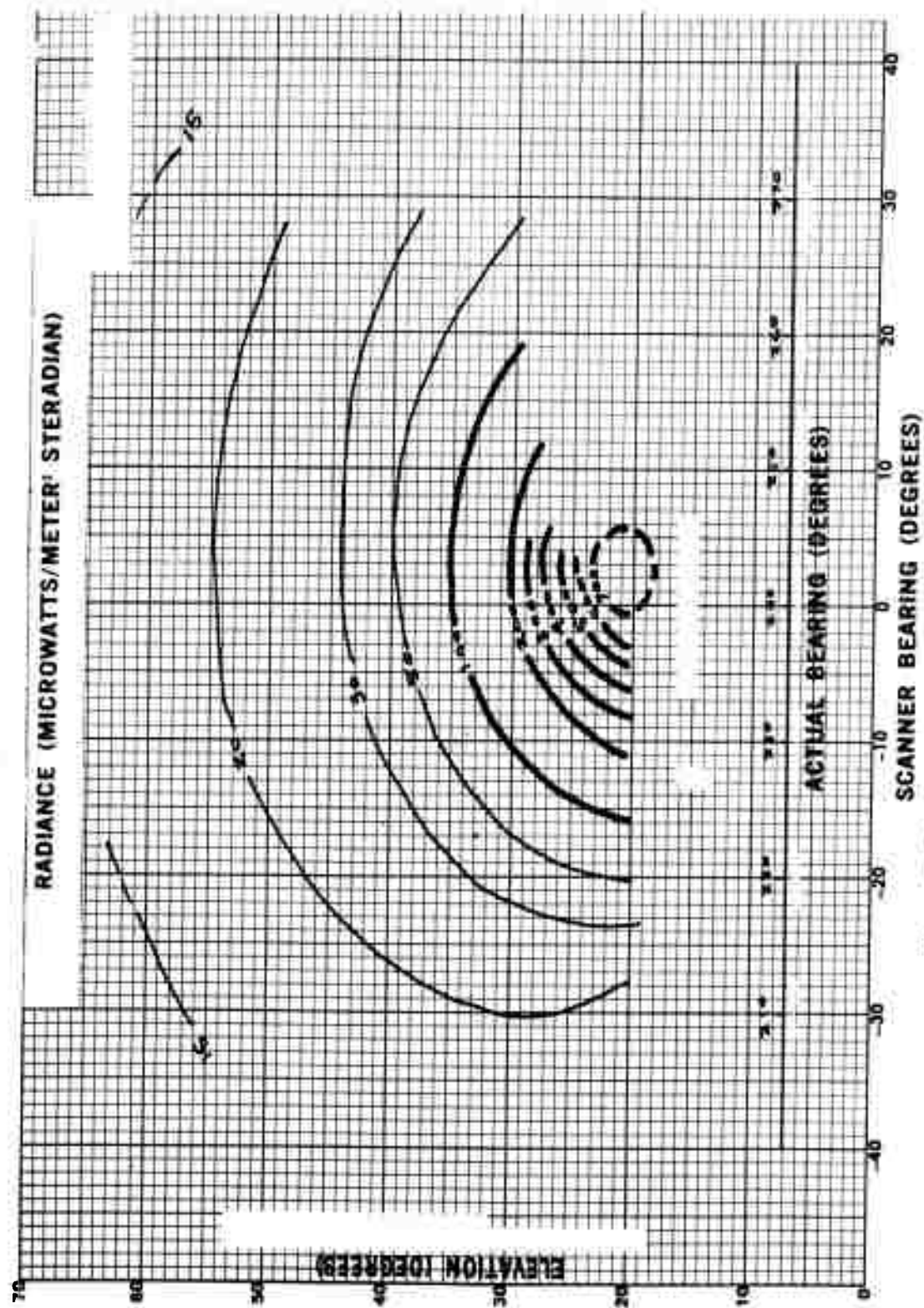


Figure 3.504 Sky radiance, Kettle I, King Fish, 0.358 to 0.408 micron, H + 469 sec.

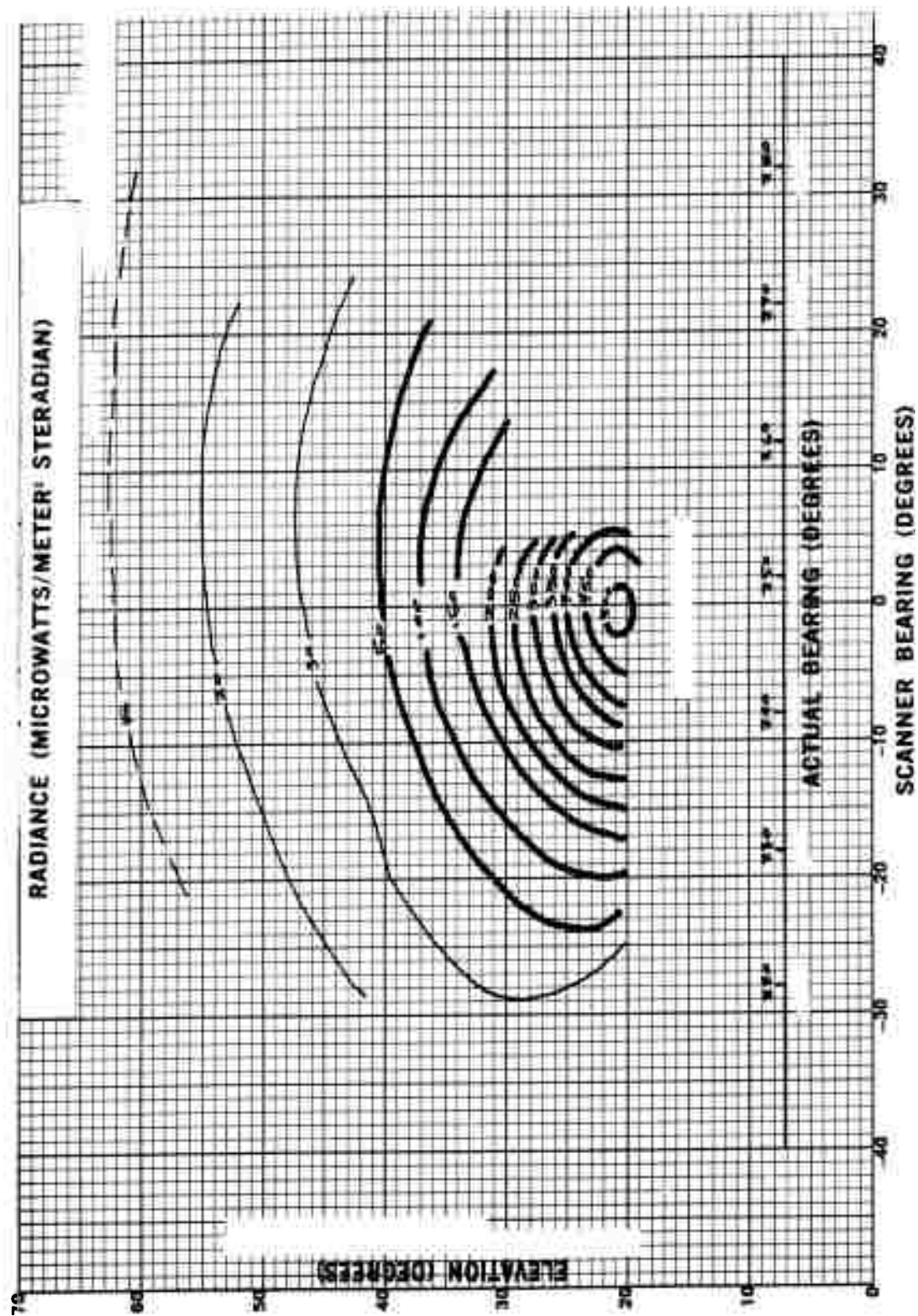


Figure 3.505 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 537 sec.

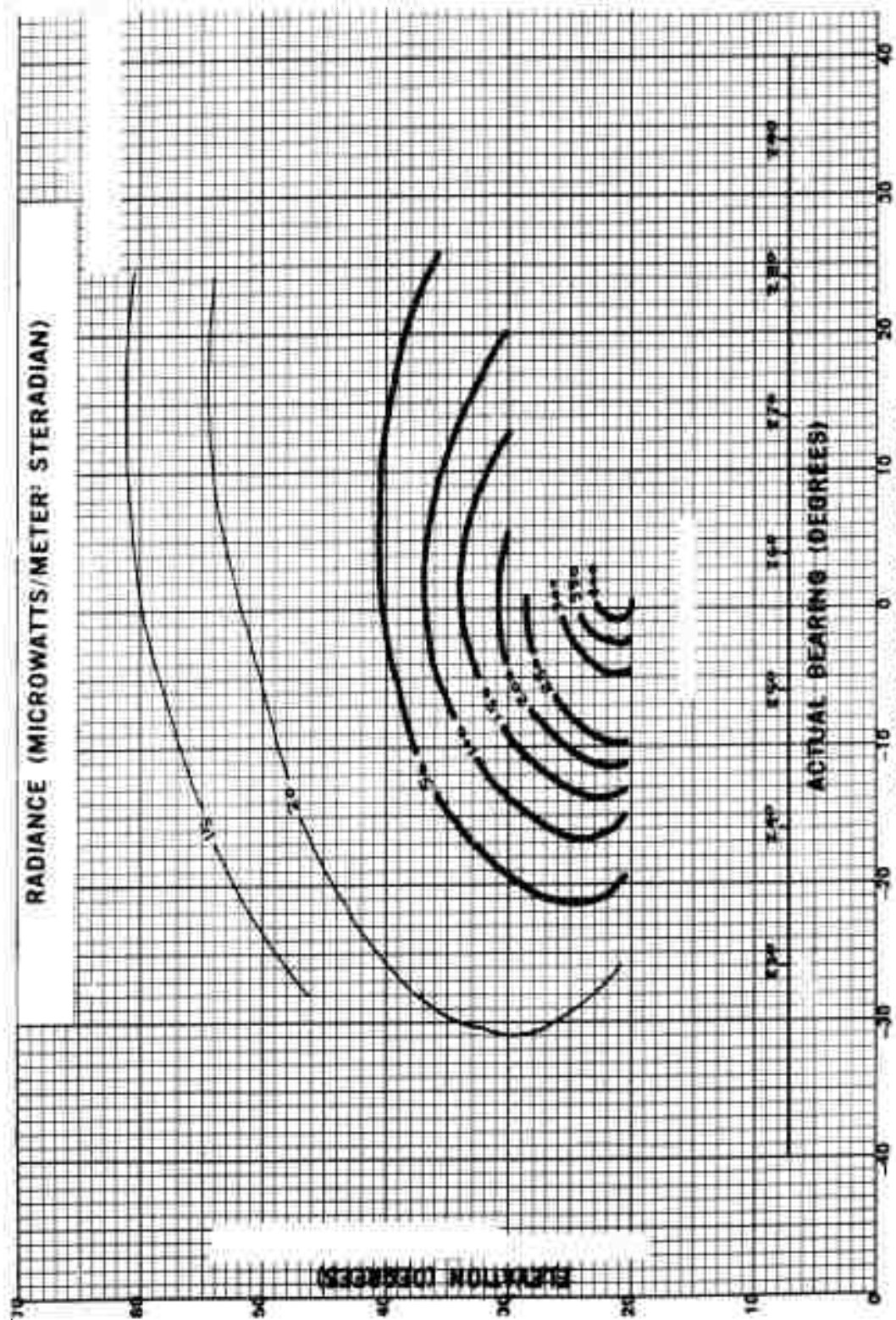


Figure 3:507 Sky radiance, Kettin I, King Flat, 0.558 to 0.568 microns, H + 672 sec.

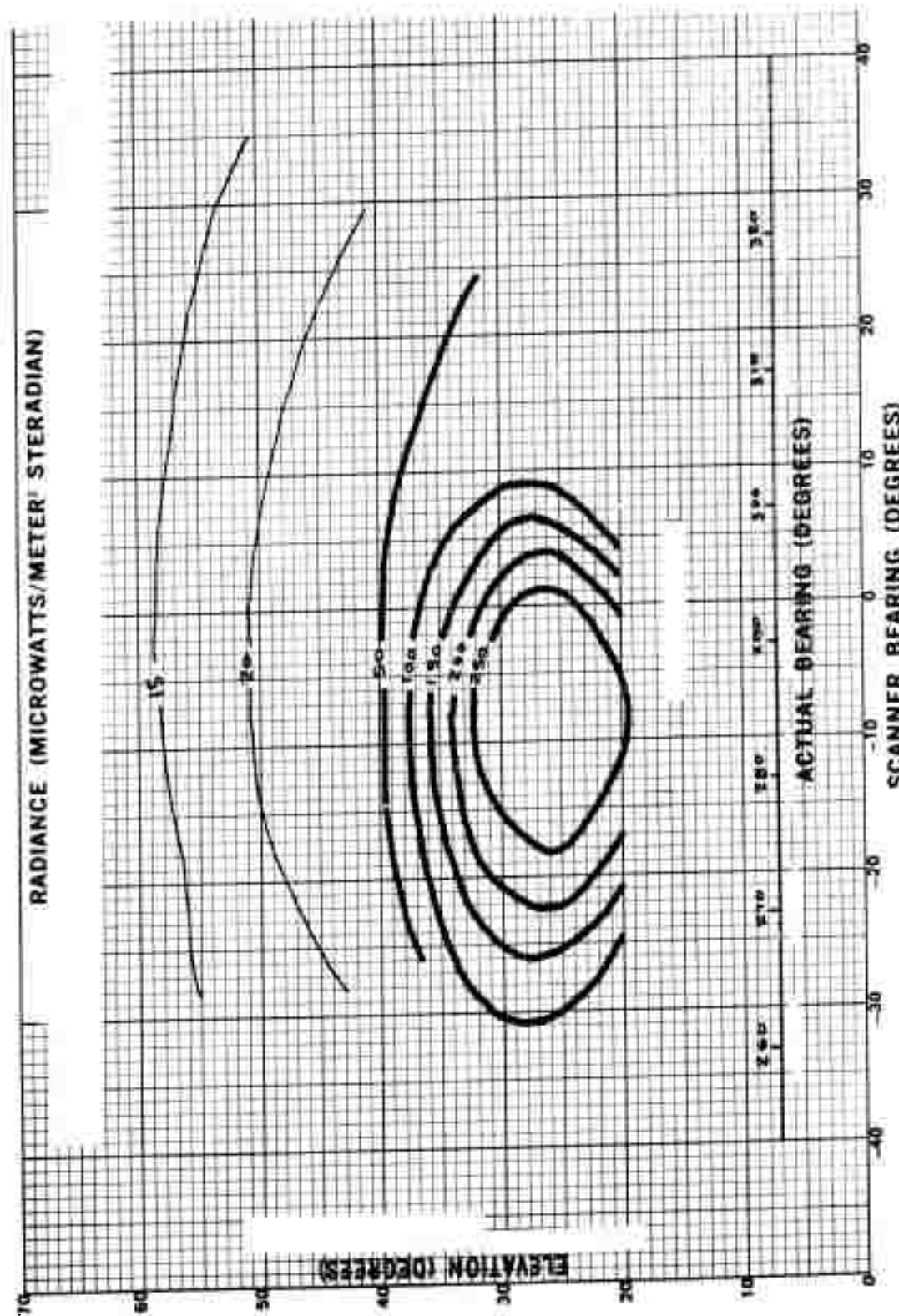


Figure 3.509 Sky radiance, Kettle I, King Fish, 0.508 to 0.559 micron. H + 1.011 sec.

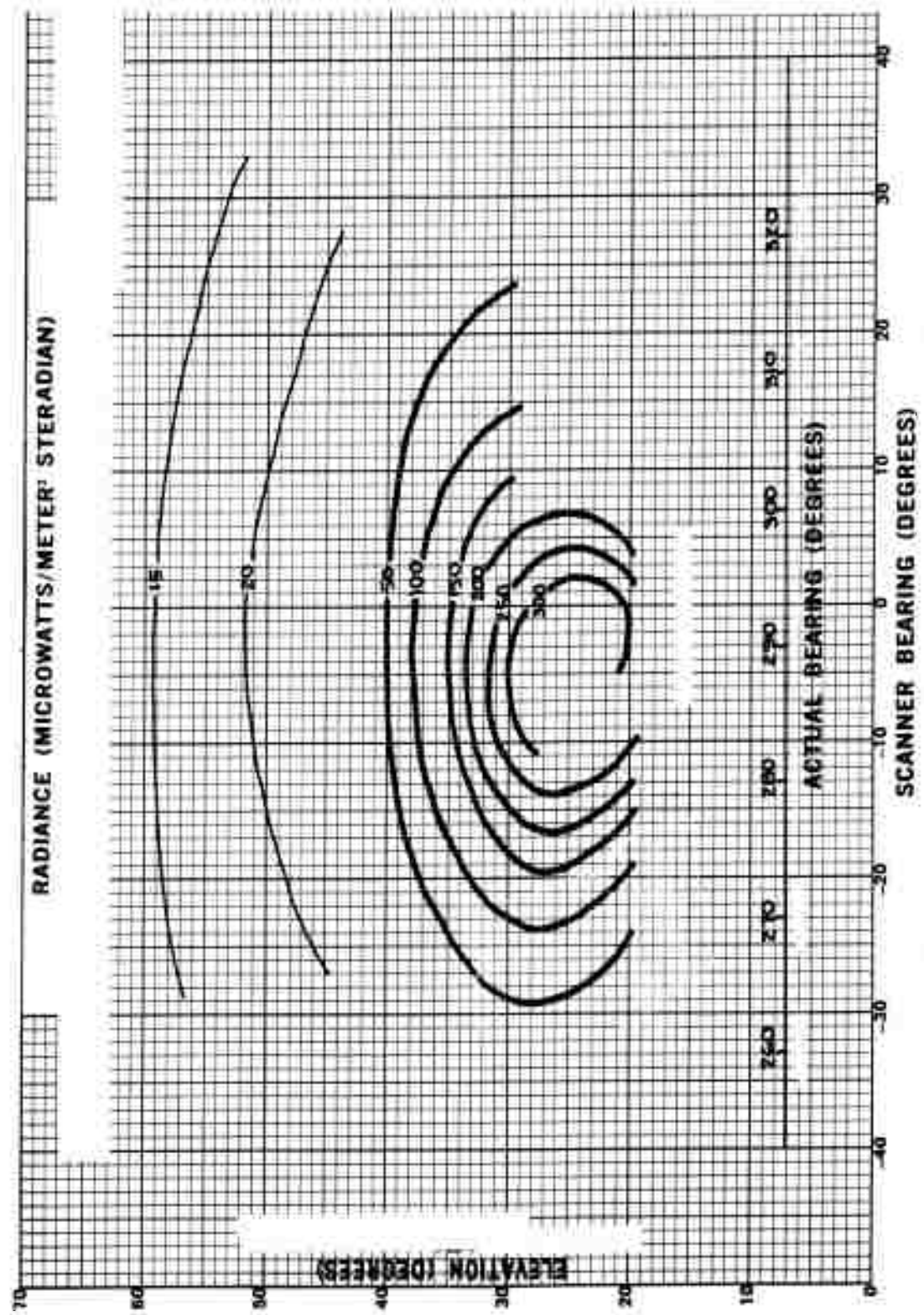


Figure 3.510 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 1,078 sec.

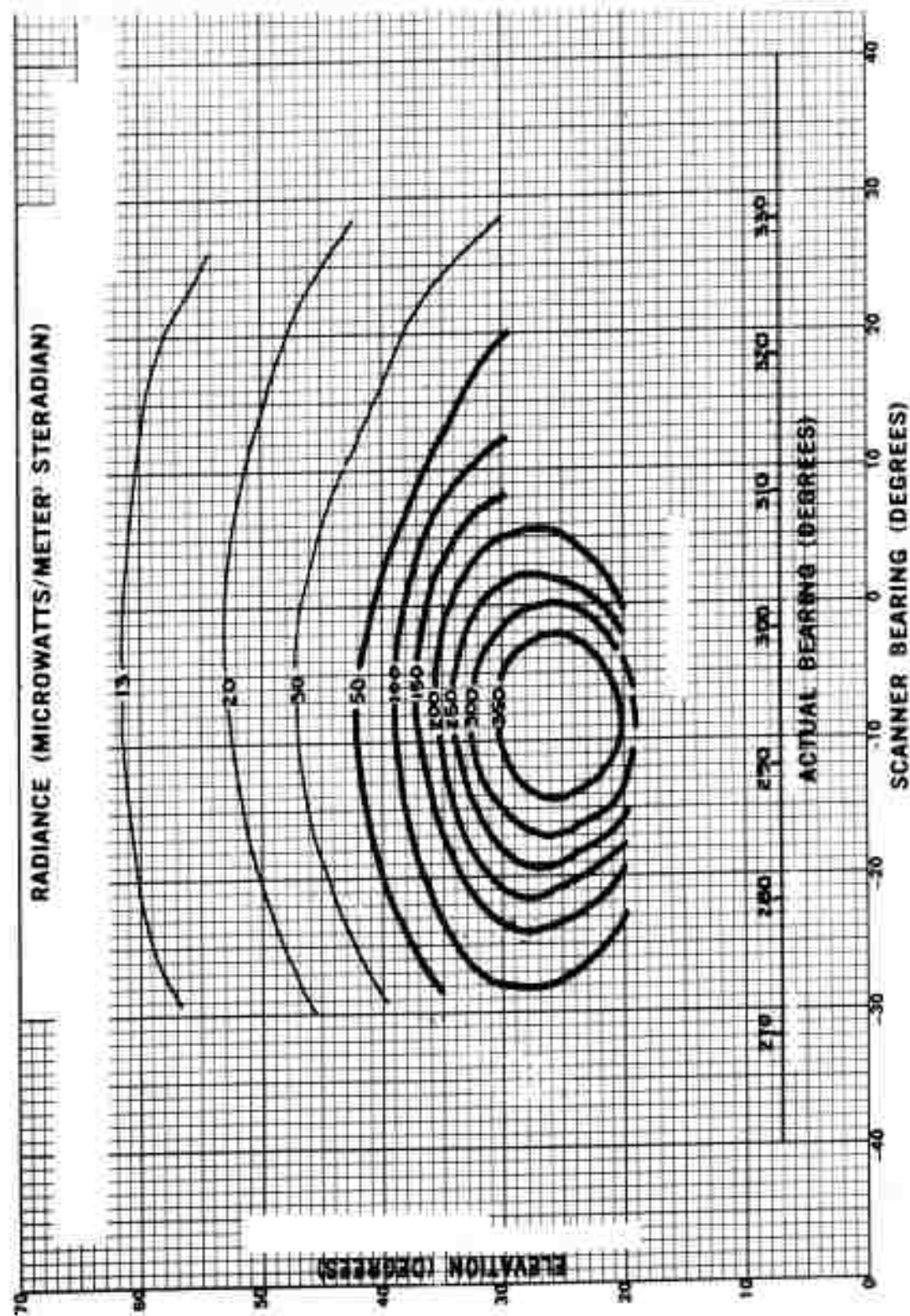


Figure 3.511 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H+1.146 sec.

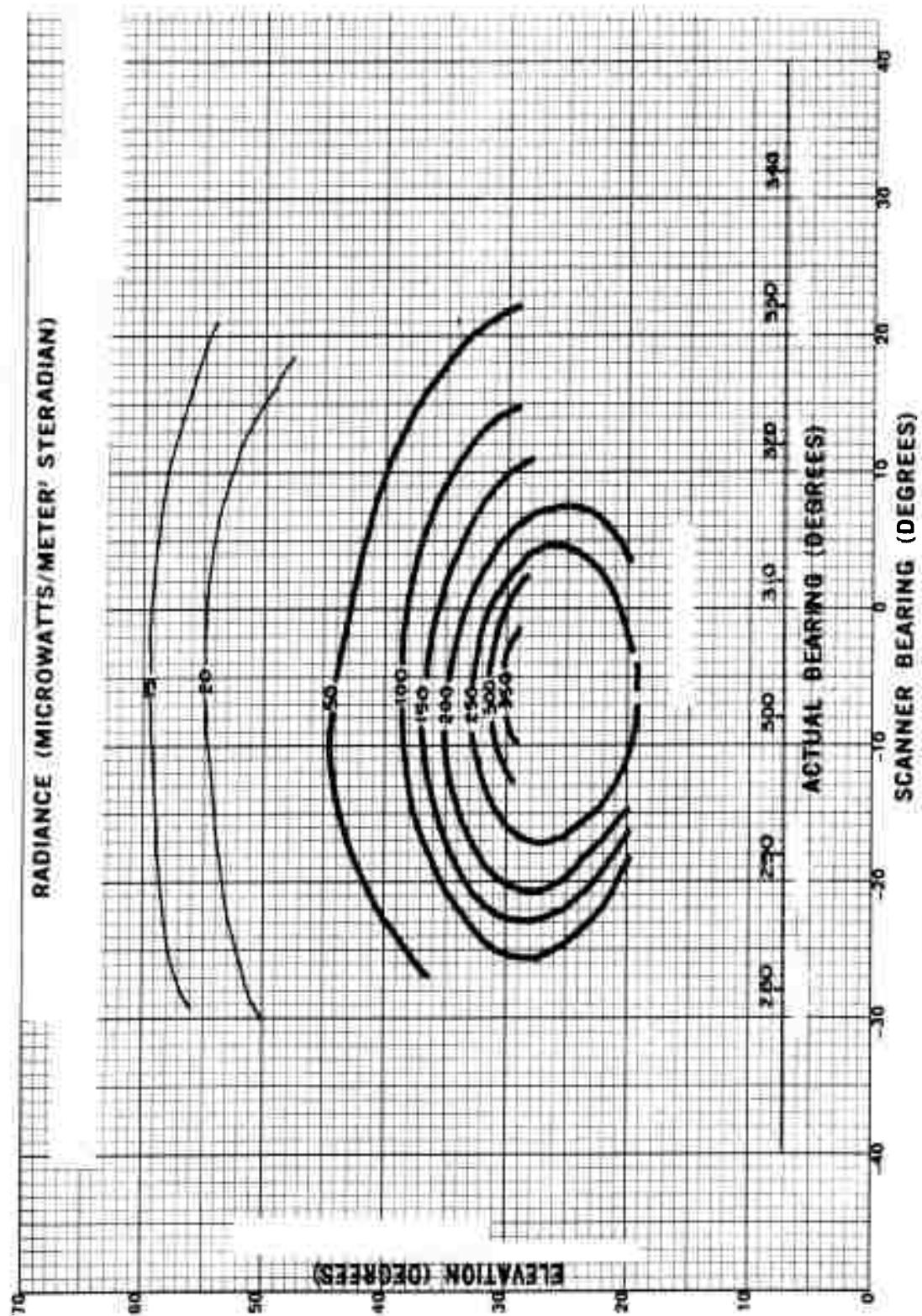


Figure 3.512 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 1,214 sec.

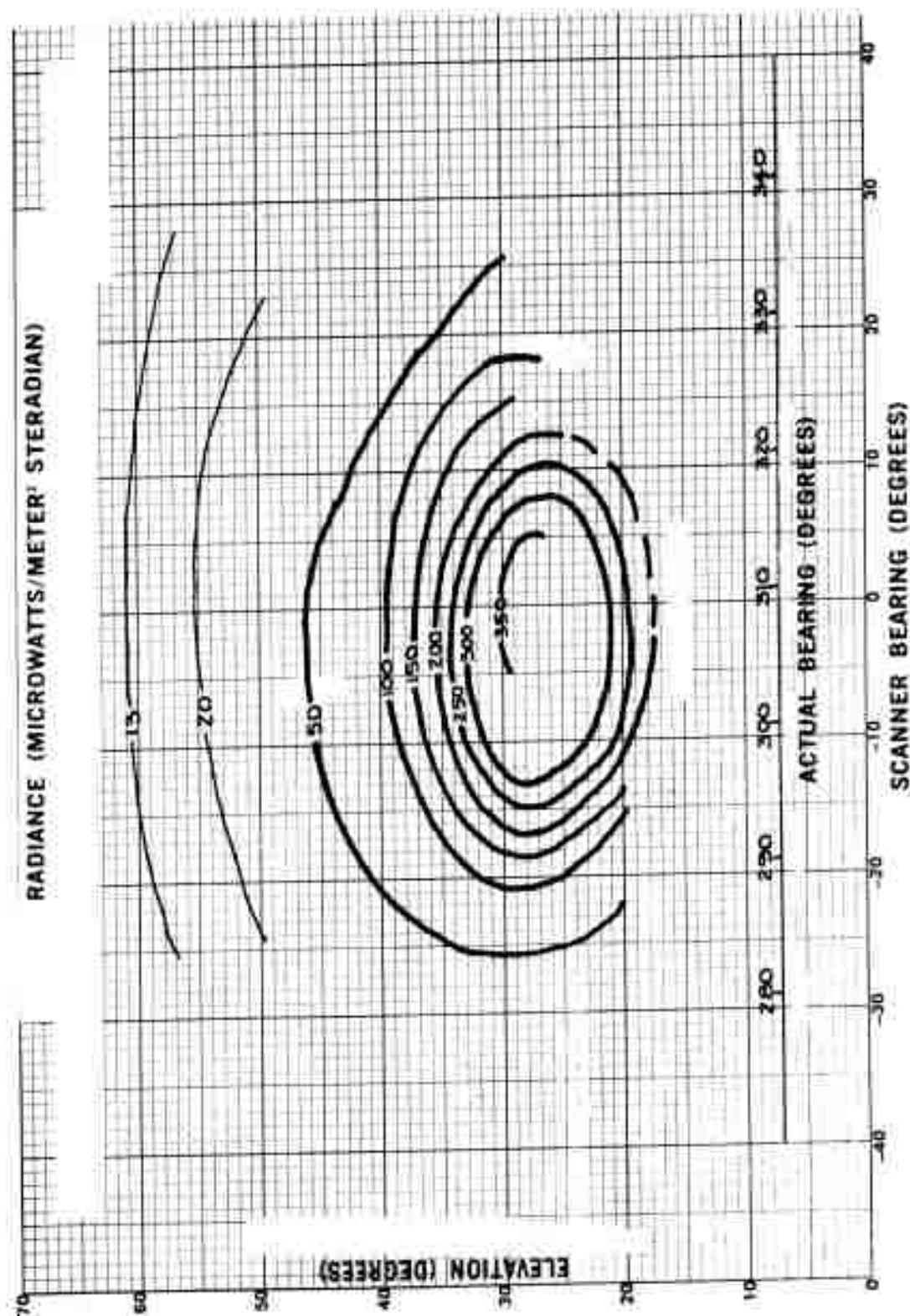


Figure 3.513 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H+1,282 sec.

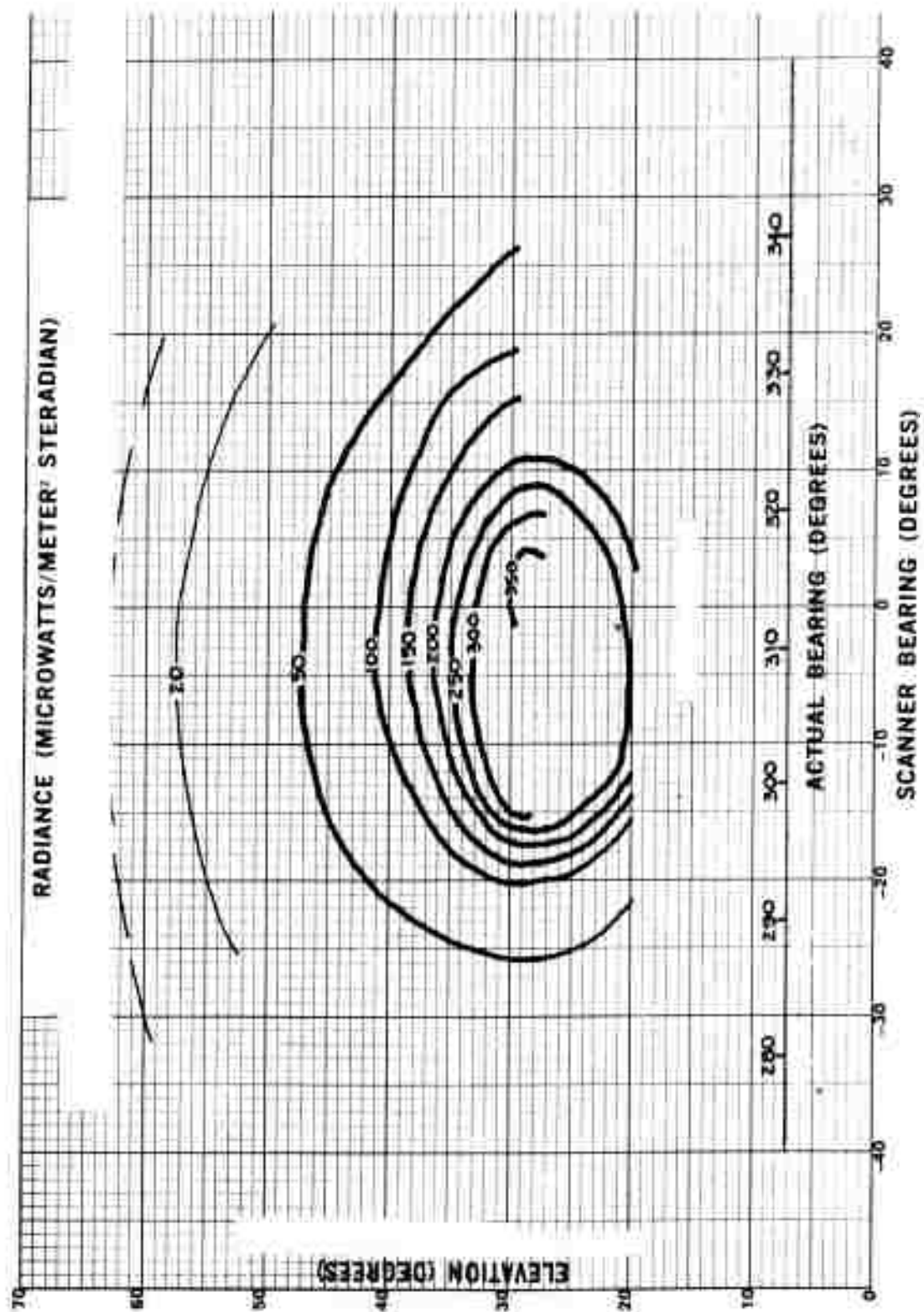


Figure 3.514 Sky radiance, Kettle I, King Fish, 0.558 micron, H + 1,349 sec.

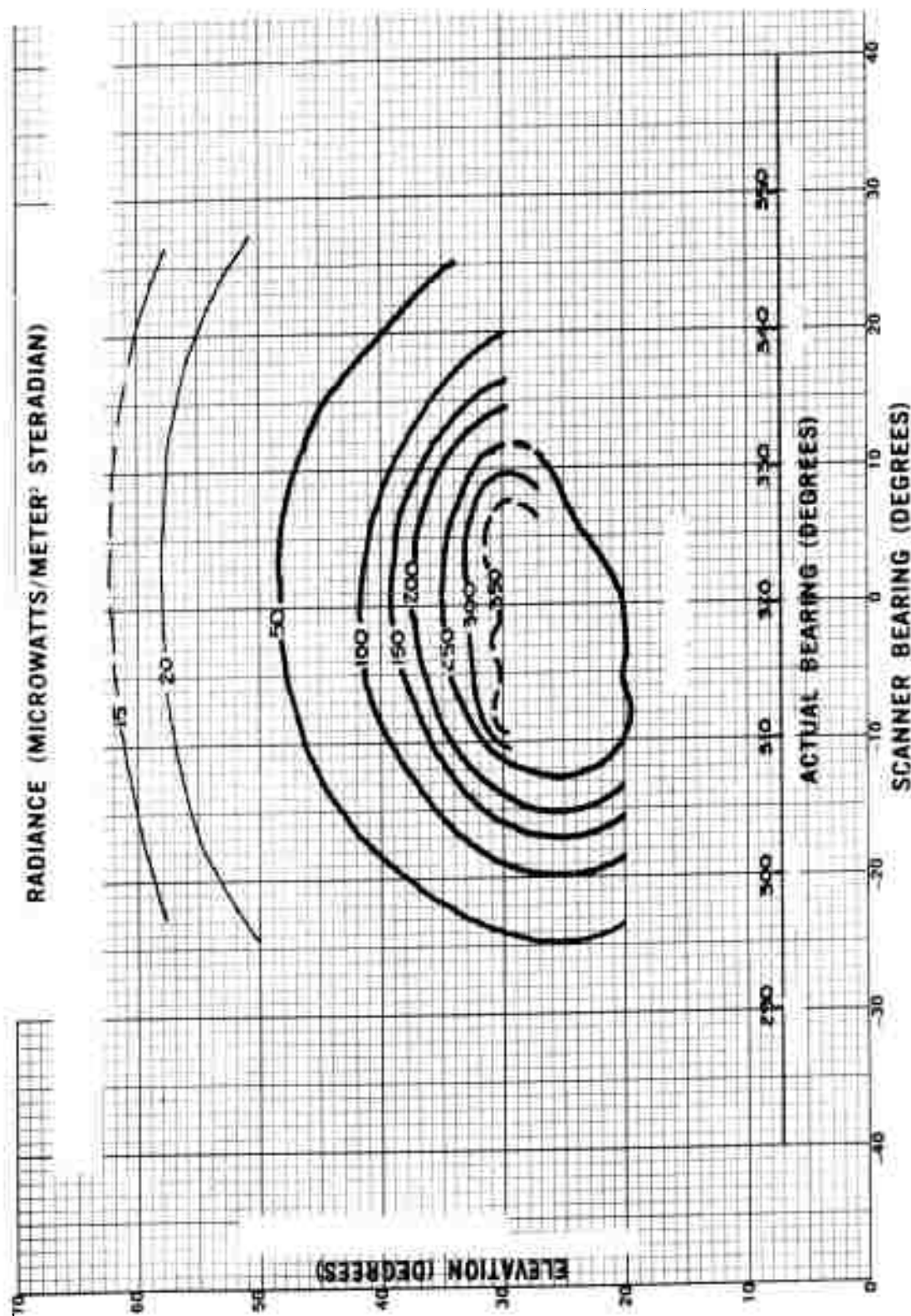


Figure 3.513 Sky radiance, Kettle I, King F (ab, 0.358 to 0.558 micron, H+1.417

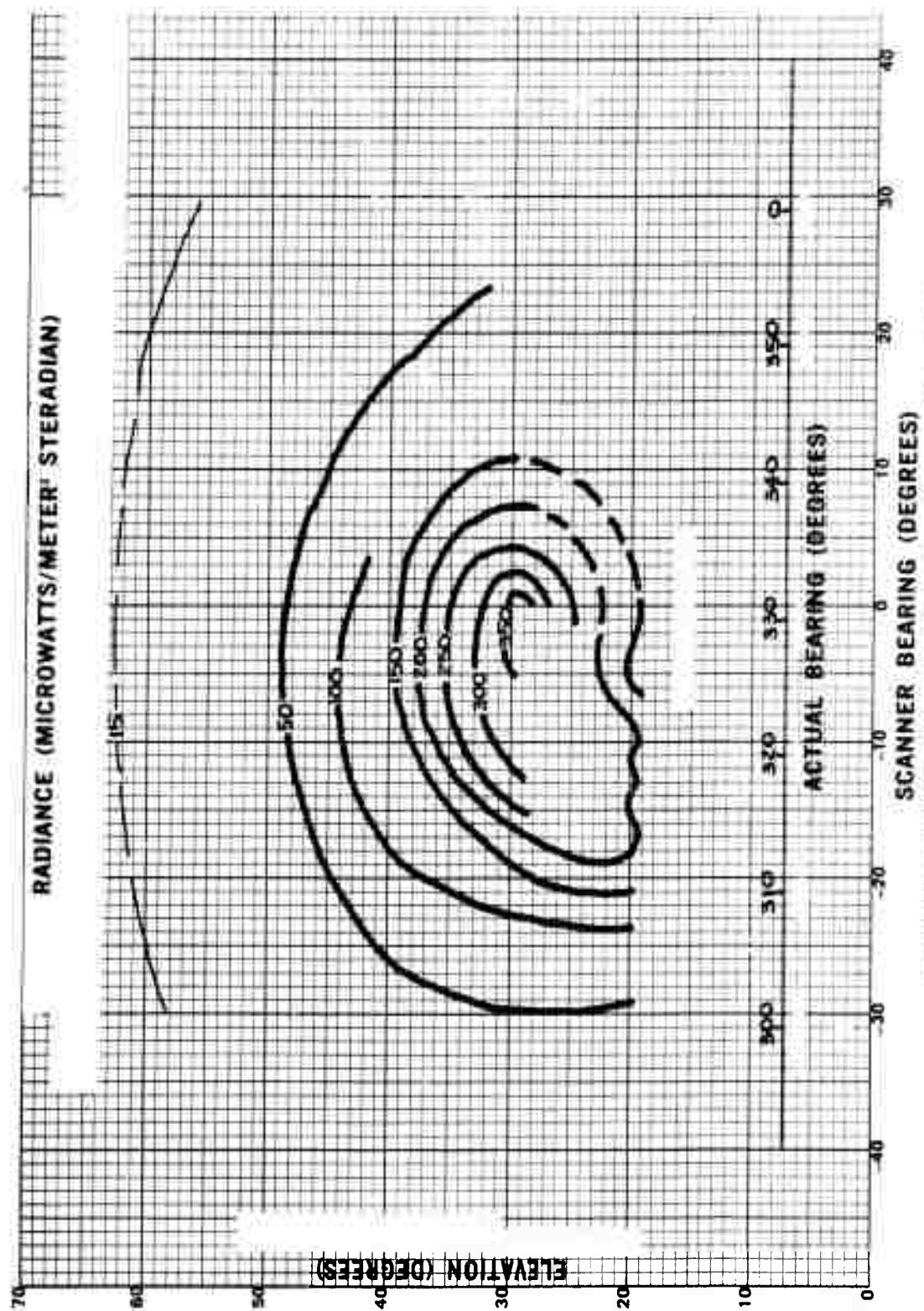


Figure 3-516 Sky radiance, Kettle I, King Fish, 0.358 to 0.608 micron, ± 1.455 sec.

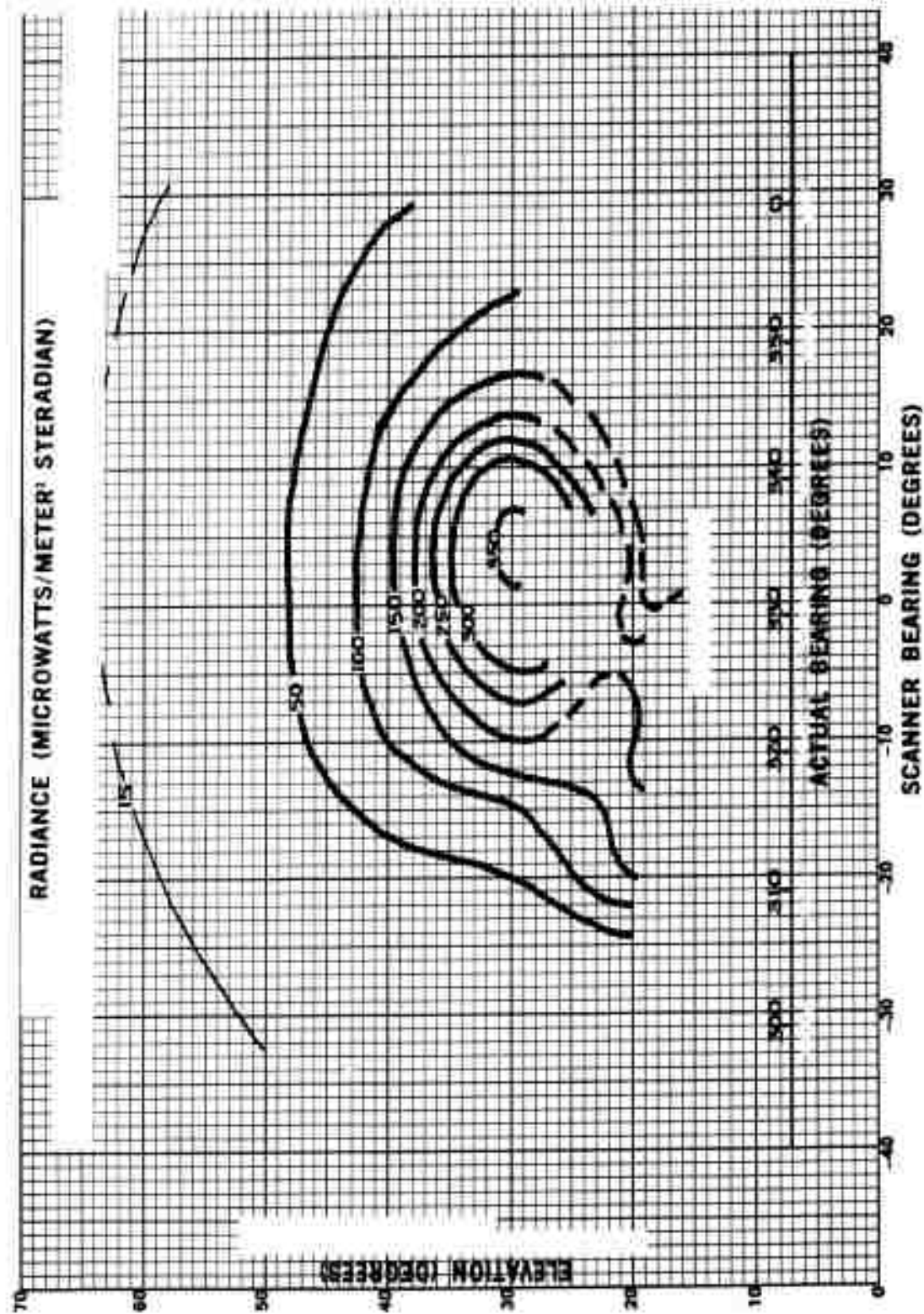


Figure 3.517 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 1,553 sec.

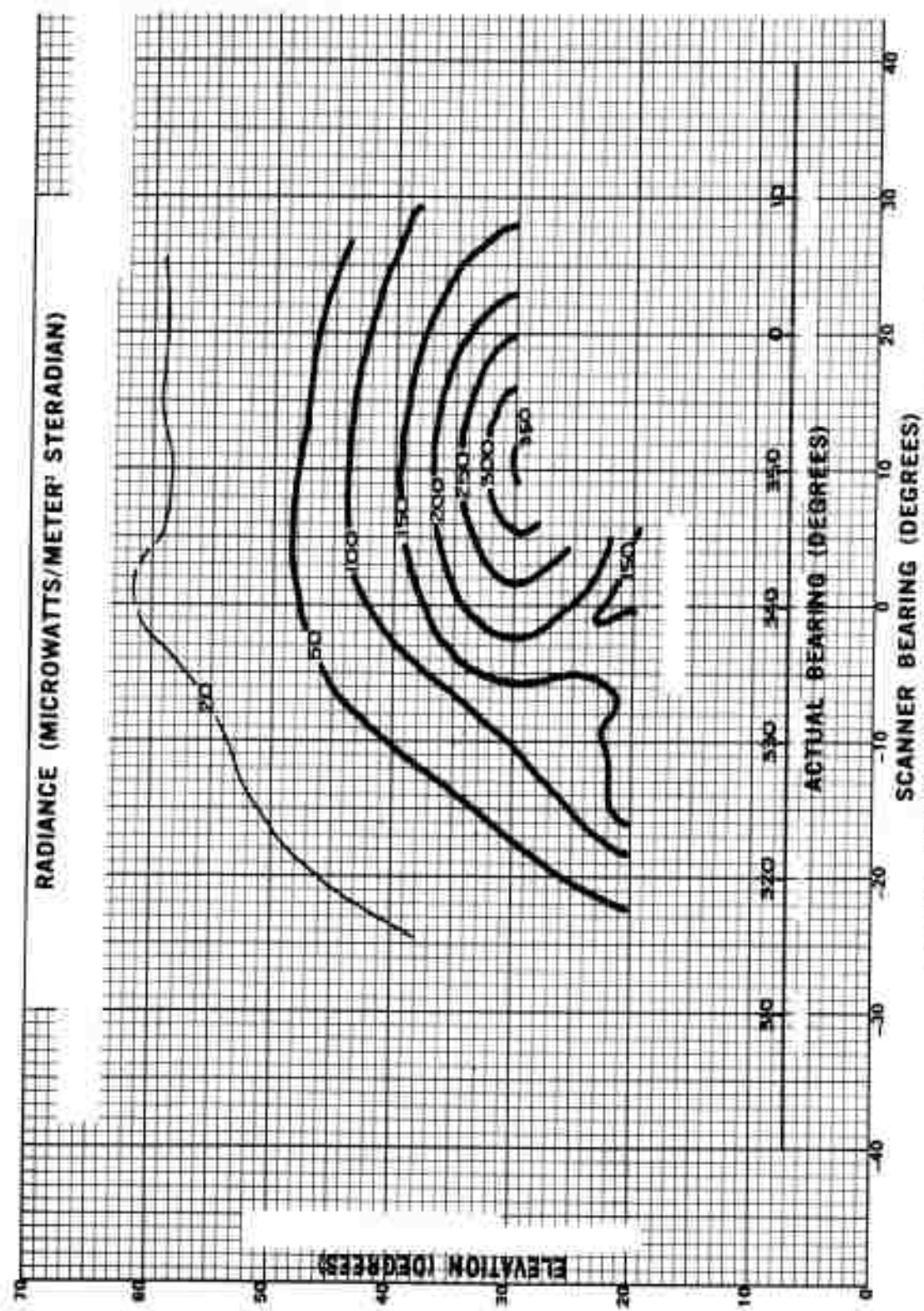
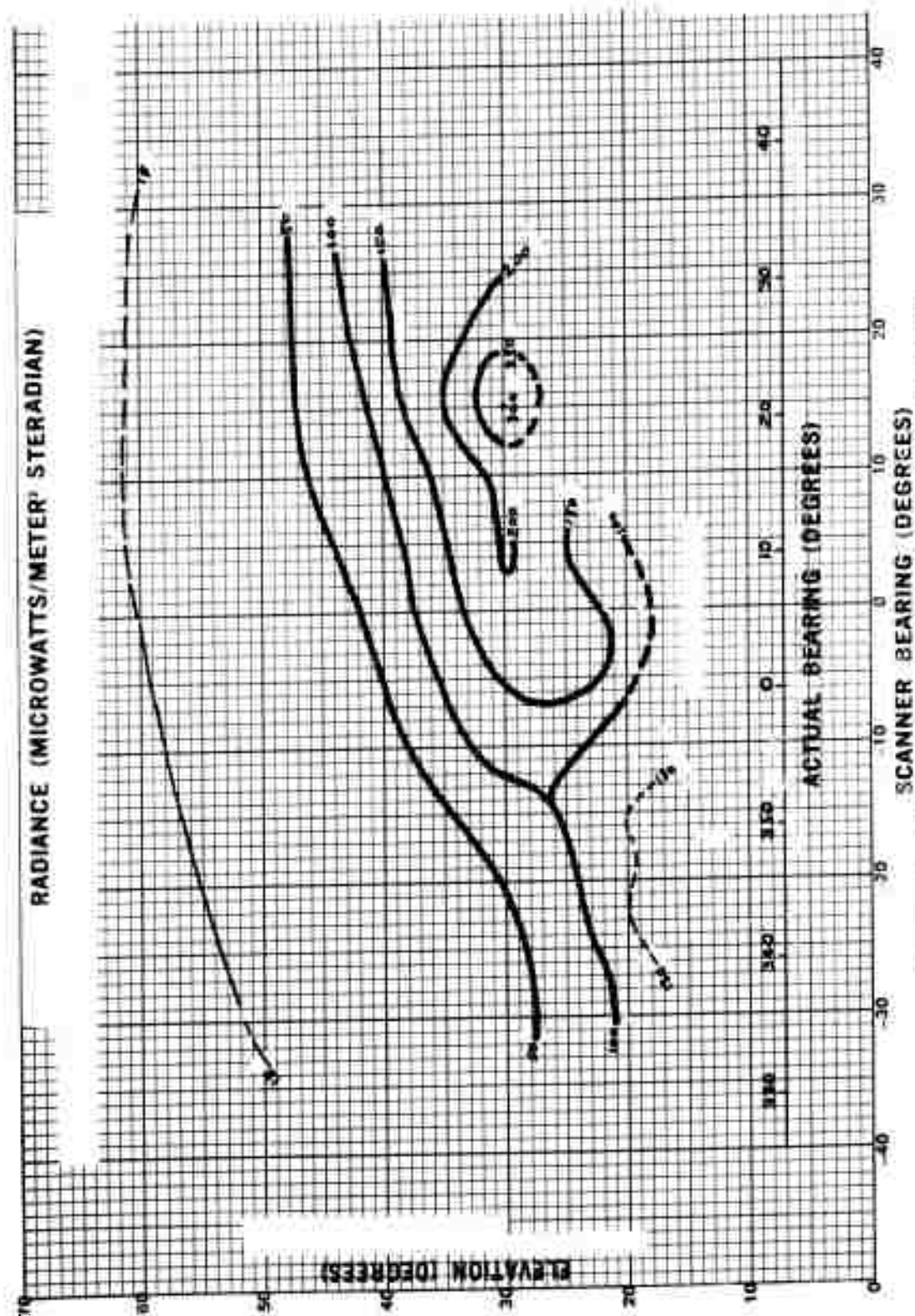


Figure 3.318 Sky radiance, Kettle 1, King Fish, 0.358 to 0.558 micron, H + 1.058 sec.



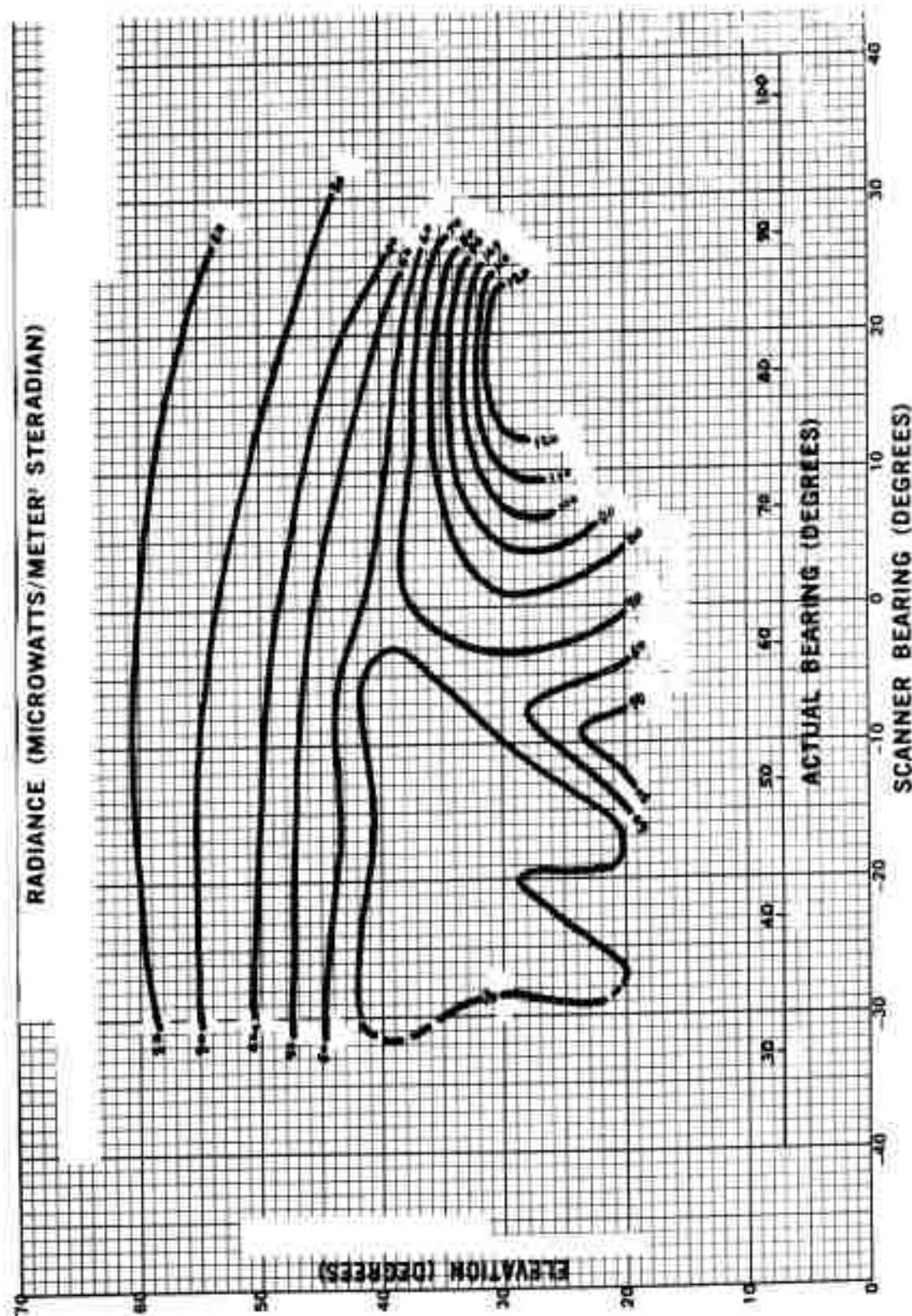


Figure 3.521 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 2,070 sec.

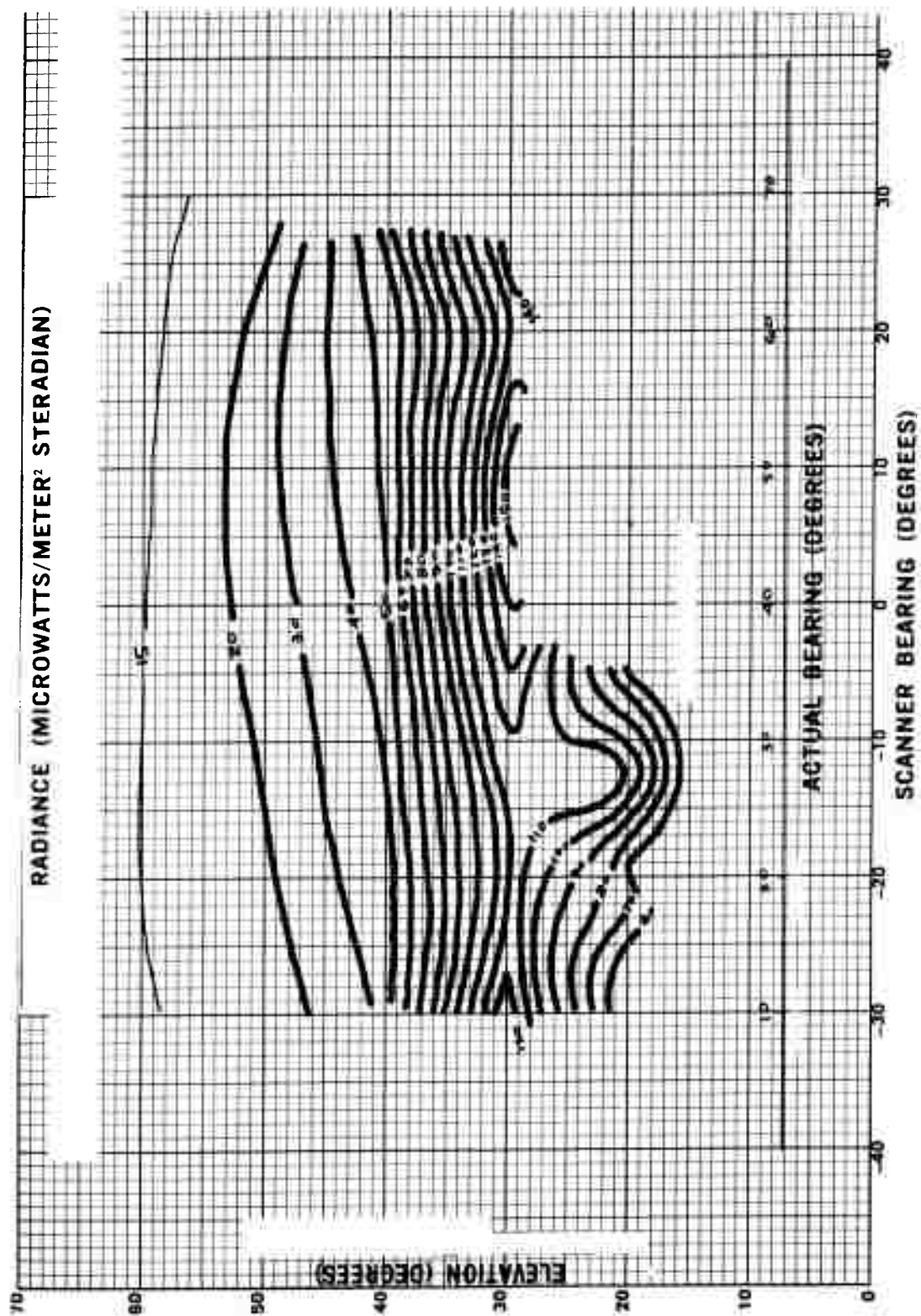


Figure 3.522 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 2,298 sec.

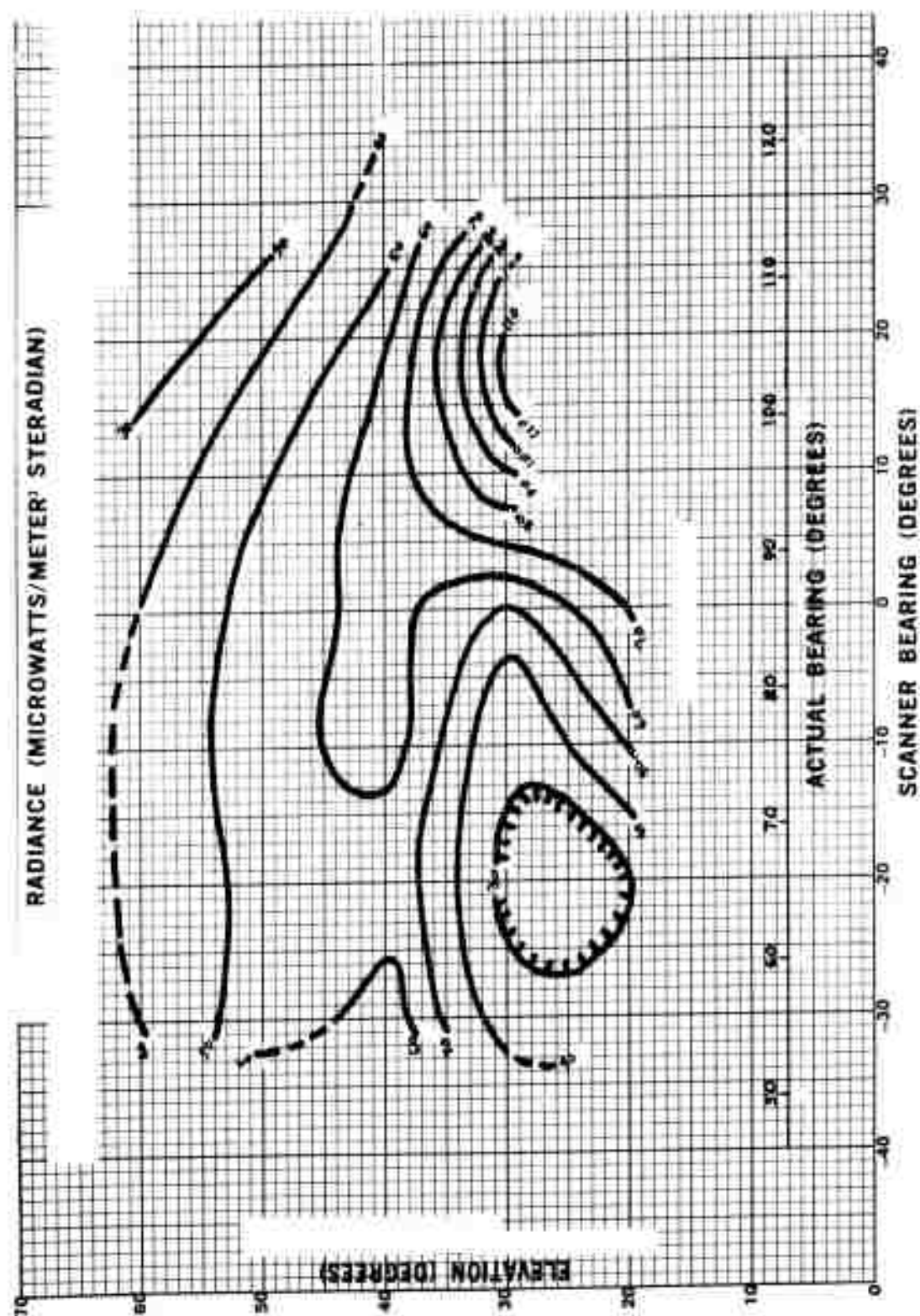


Figure 3.523 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron. H + 2,773 sec.

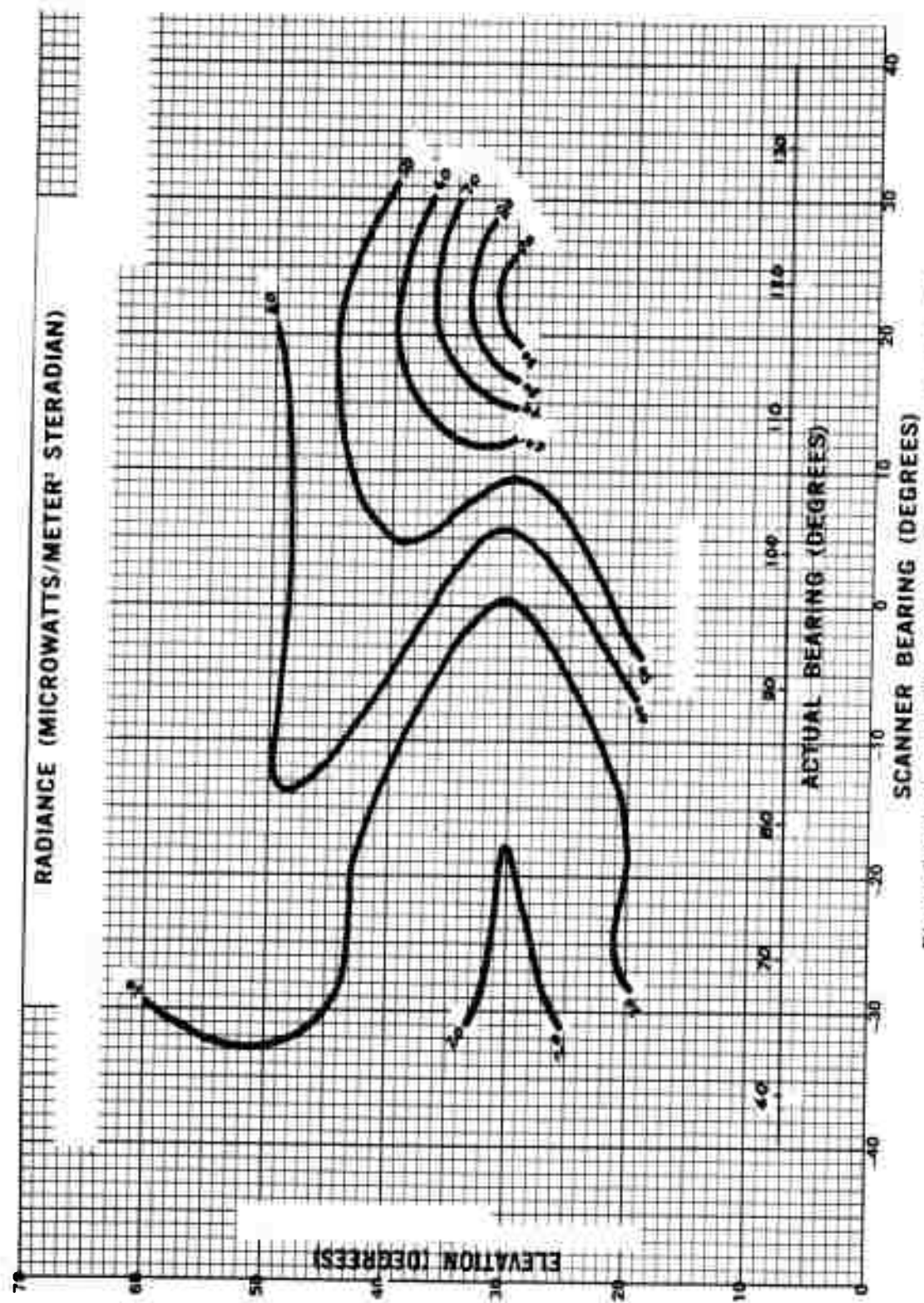


Figure 3.524 Sky radiance, Kettle 1, King Fish, 0.305 to 0.558 micron, H + 2,000 sec.

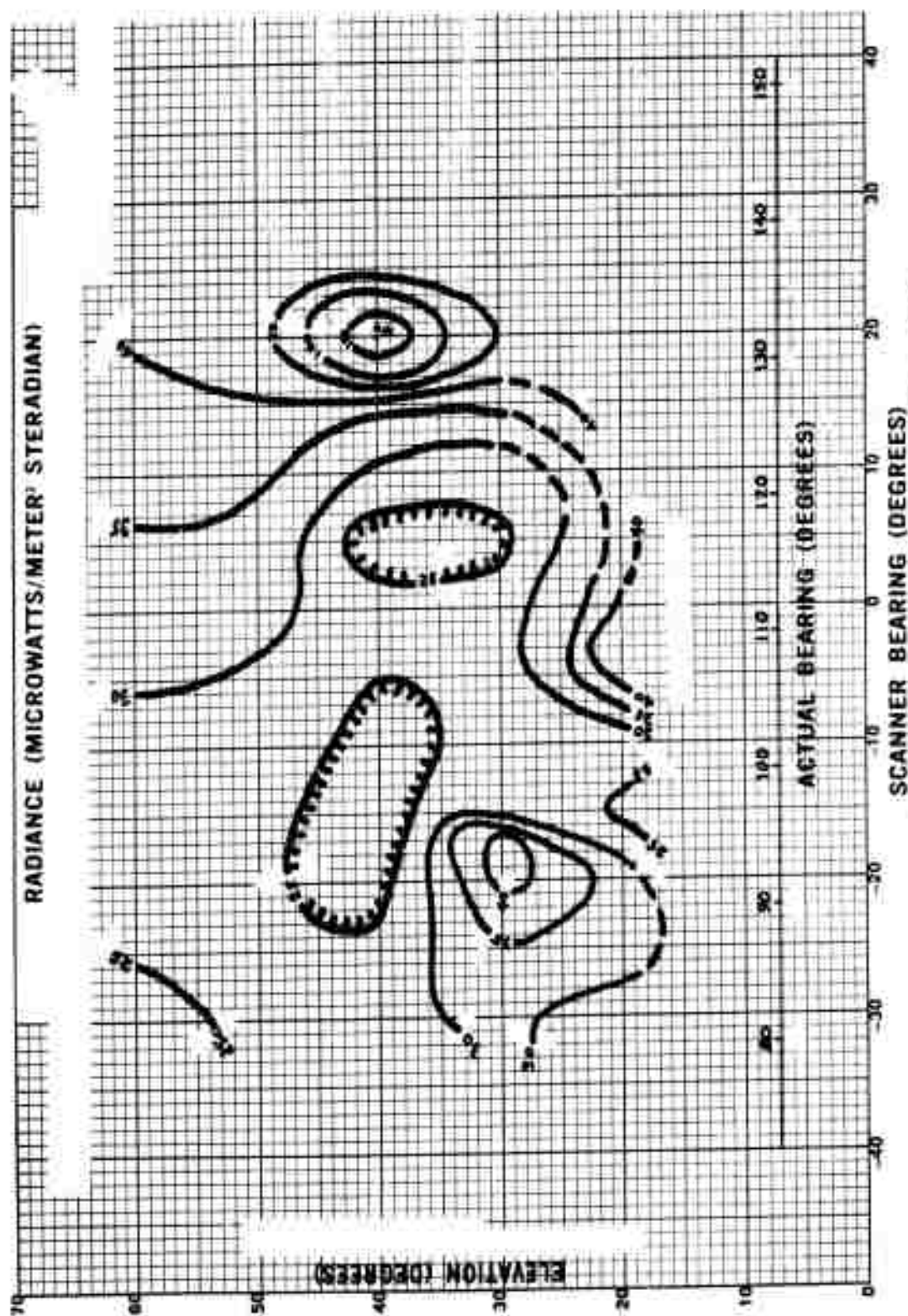


Figure 3.525 Sky radiance, Kettie I, King Fish, 0.558 to 0.558 micron, $H = 3,112$ sec.

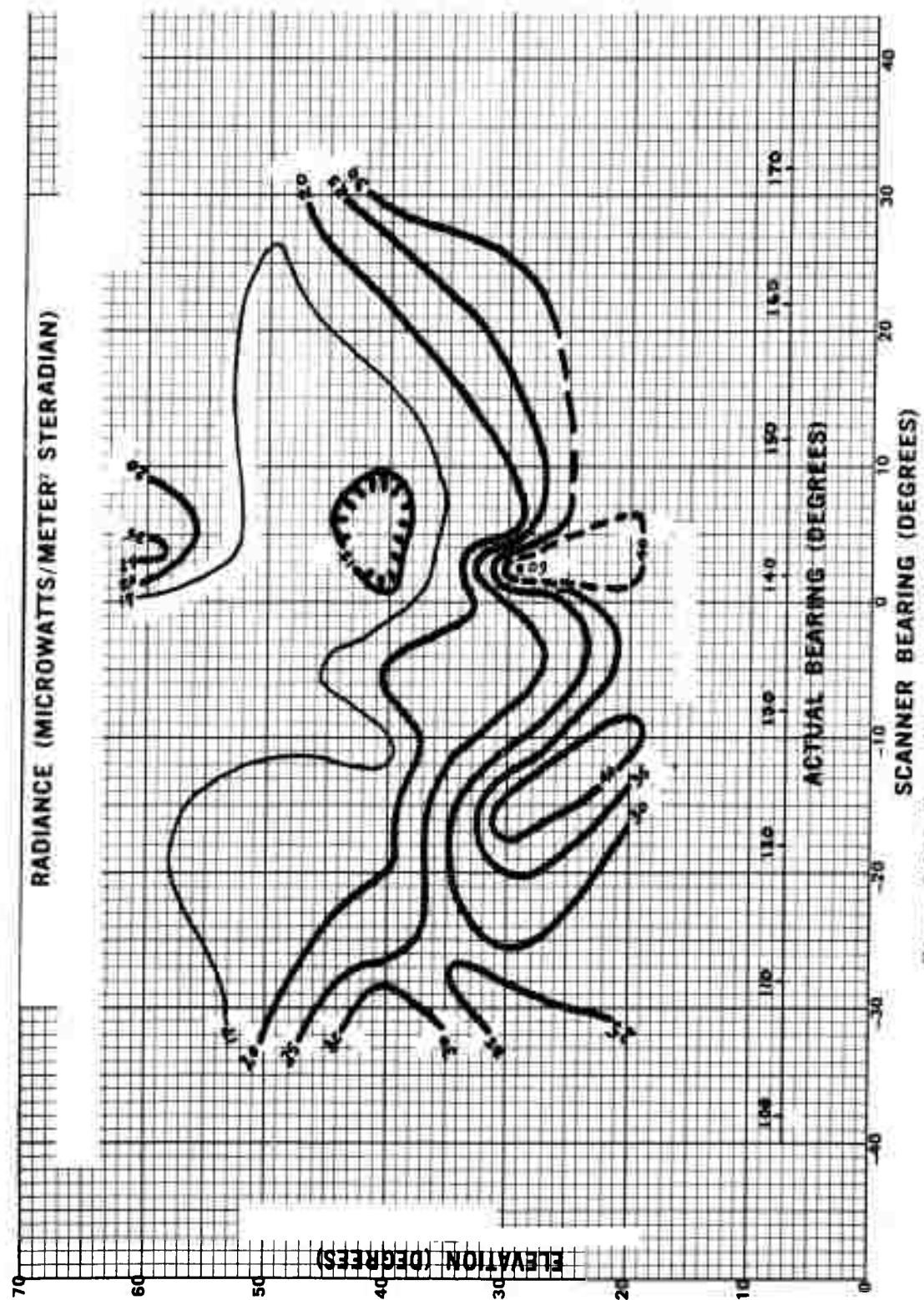


Figure 3.526 Sky radiance, Kettle I, King Fish, 0.358 to 0.559 micron, H = 0.383 sec.

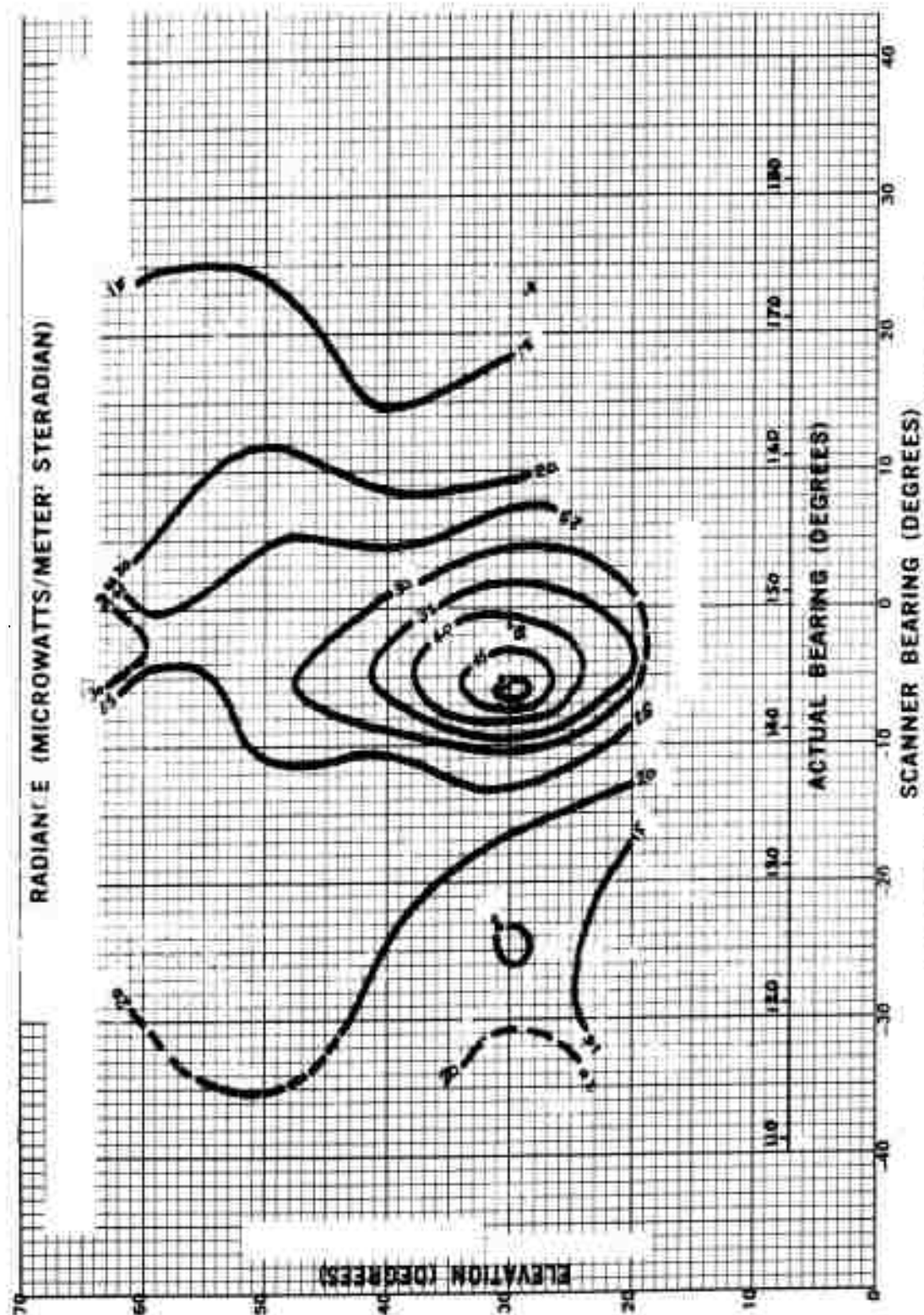


Figure 7.227 Sky radiance, Kettle I, King Fish, 0.35M to 0.80M elevation, H+0.85A sec.

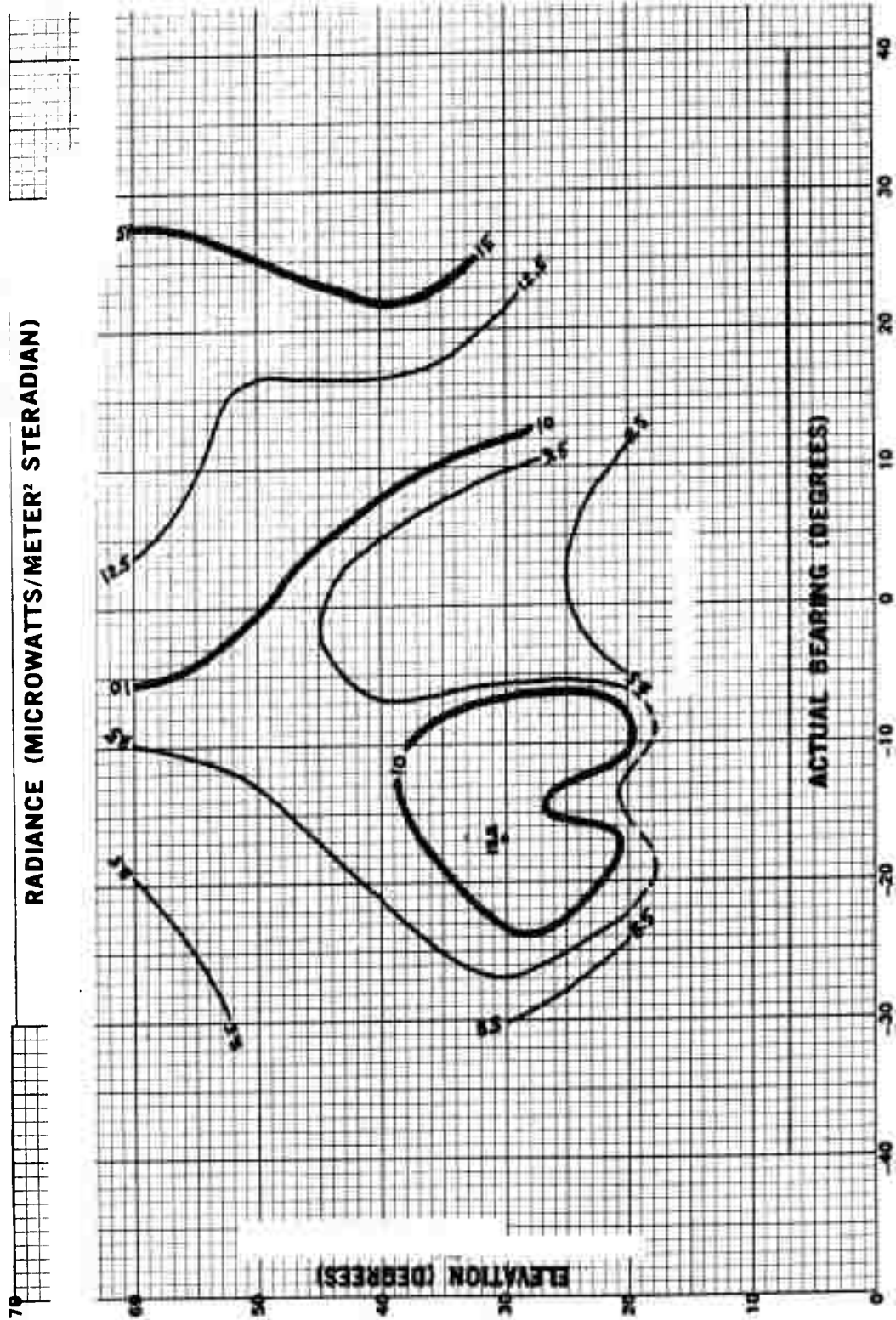


Figure 3.529 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 4,332 sec.

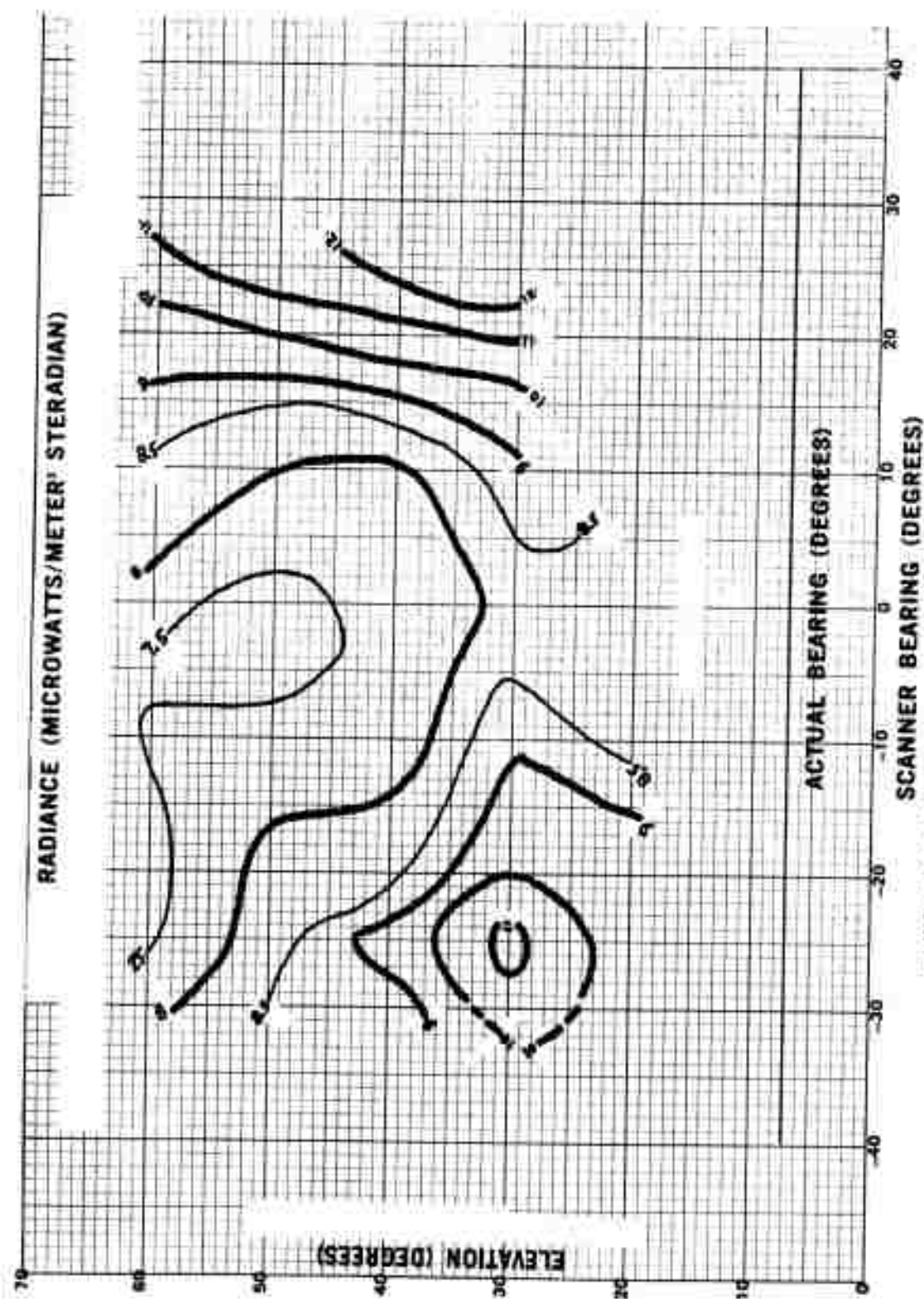


Figure 3.530 Sky radiance, Kettle I, King Fish, 0.258 to 0.558 micron, $H = 4,468$ sec.

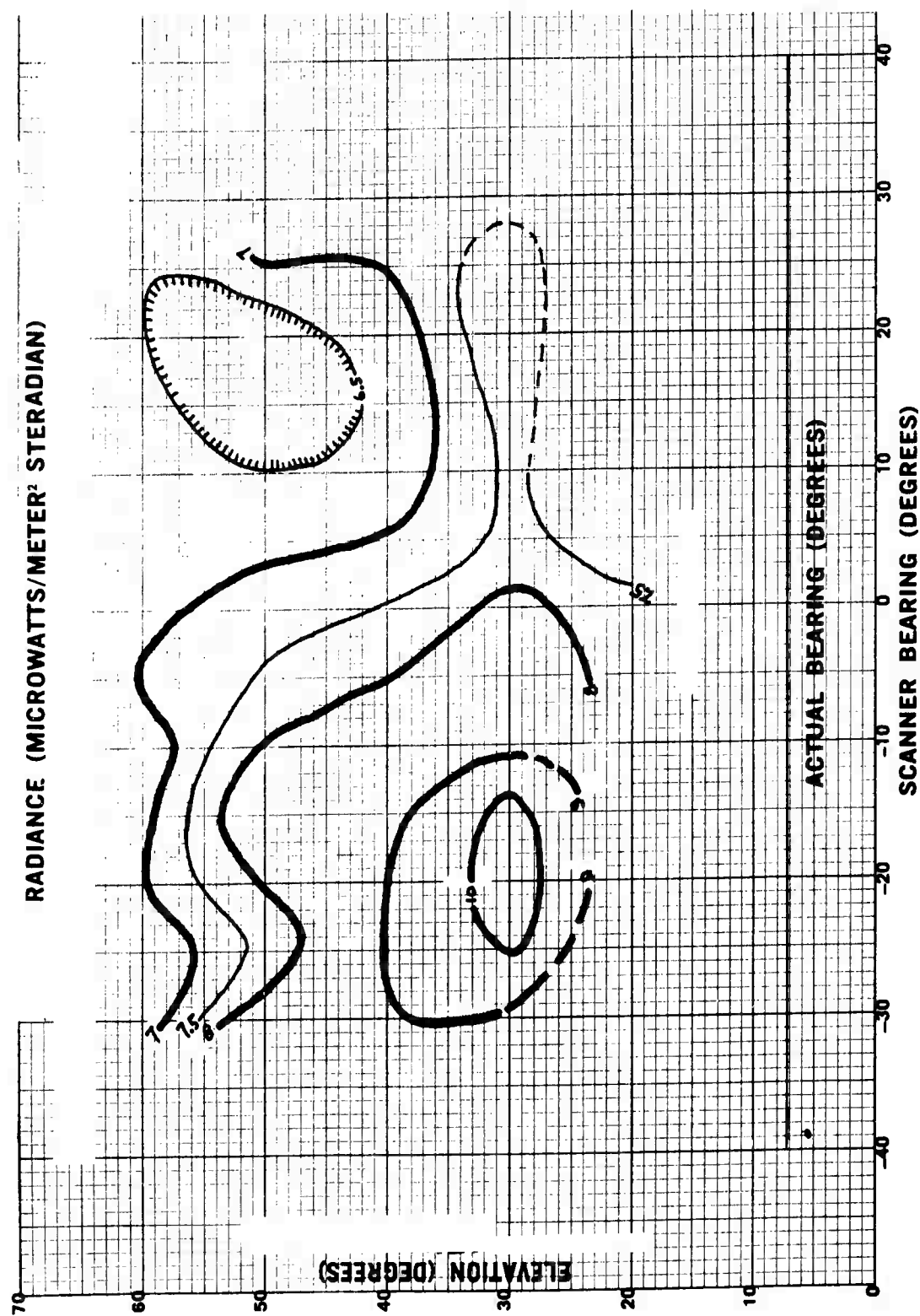


Figure 3.531 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 4,603 sec.

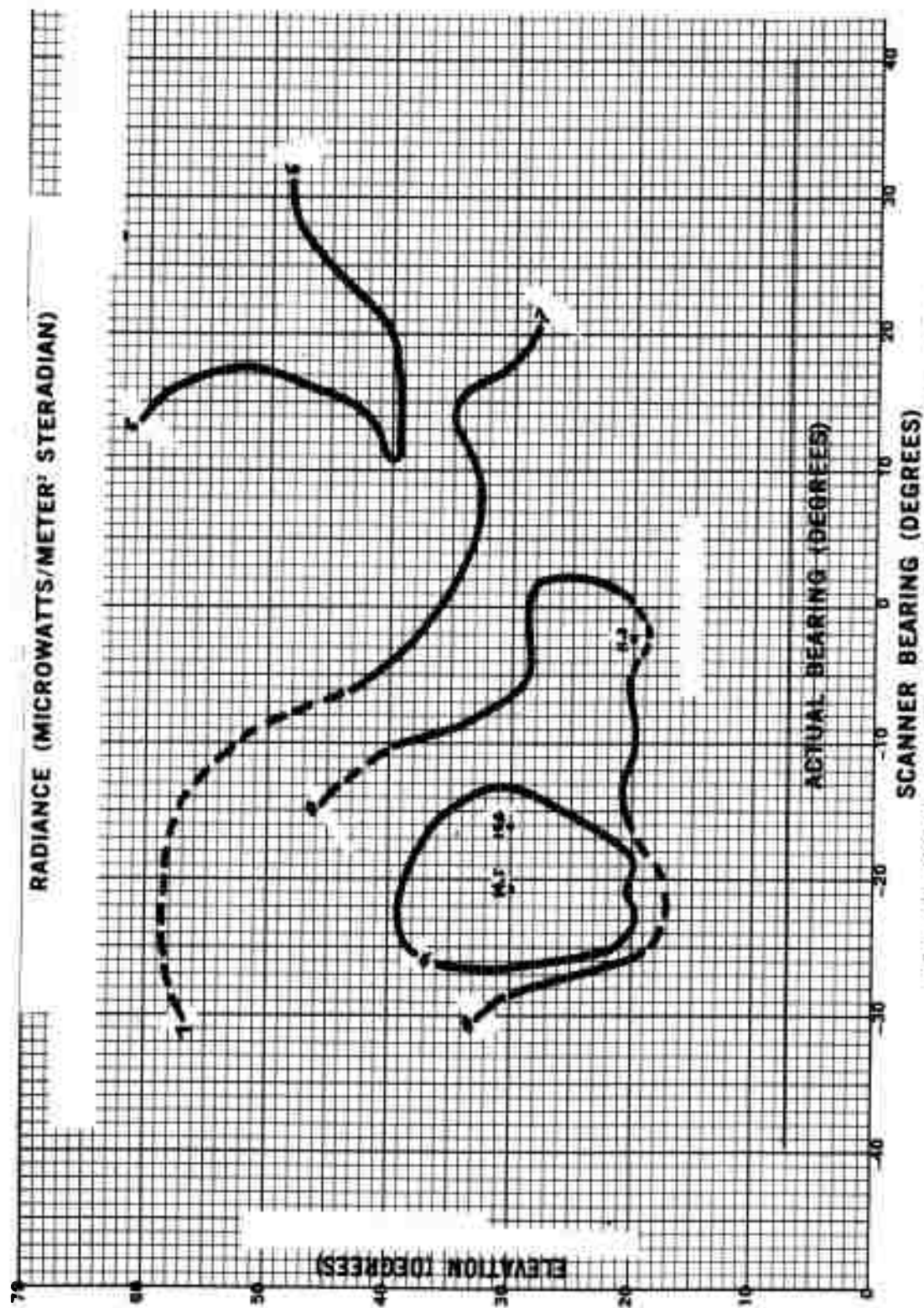


Figure 3.532 Sky radiance, Kettle I, King Fish, 0.558 micron, H + 4.739 sec.

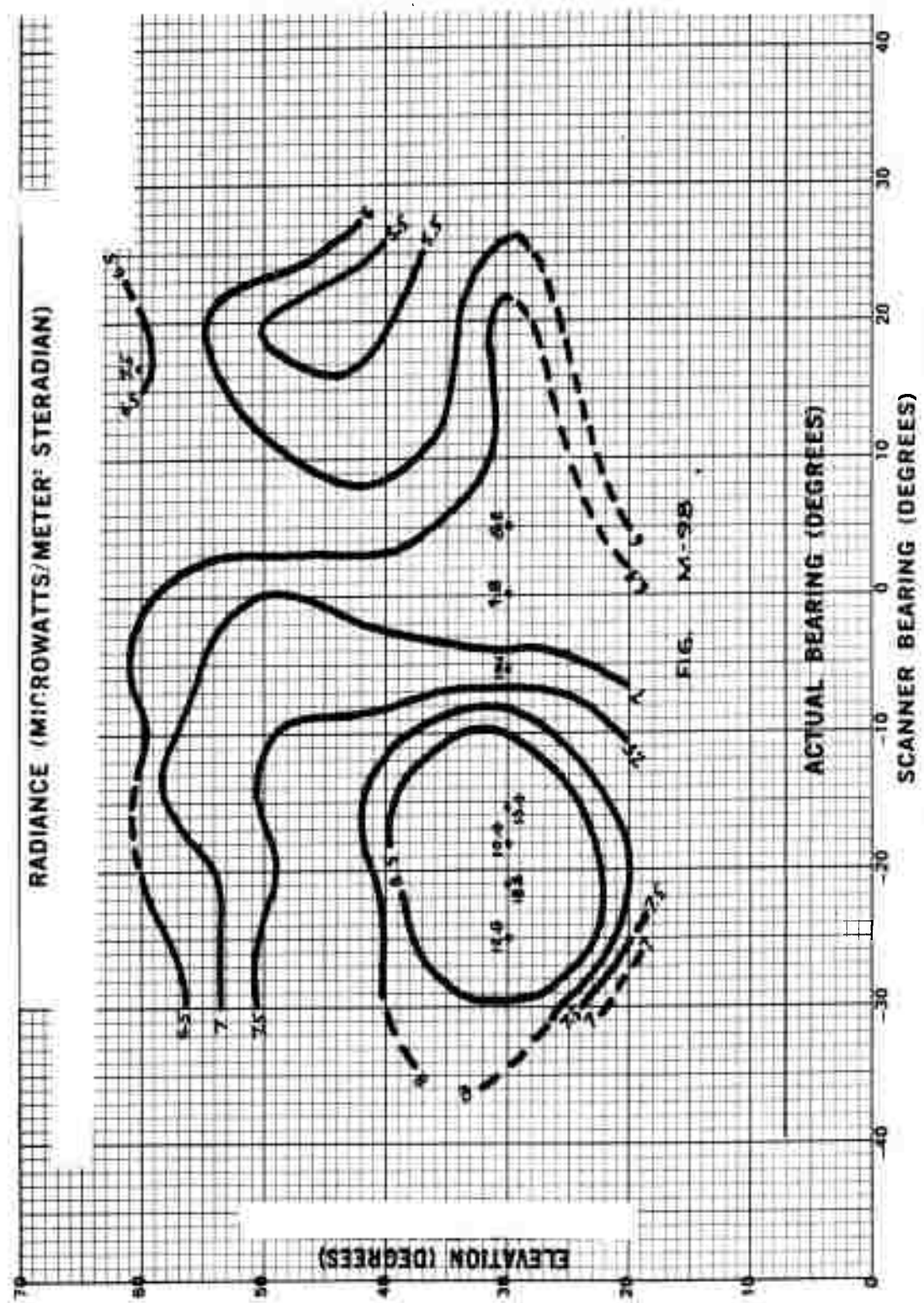


Figure 3.533 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 4,875 sec.

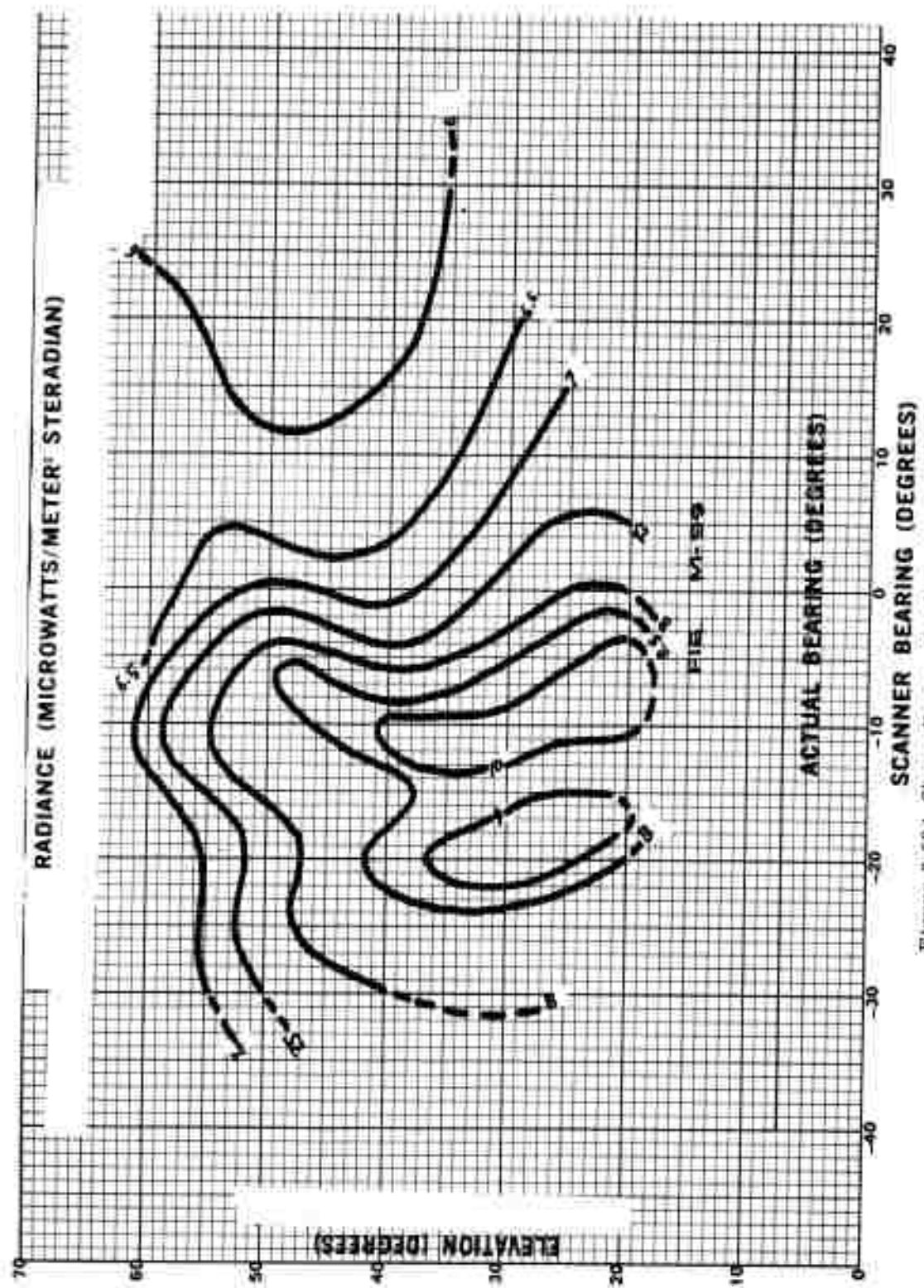
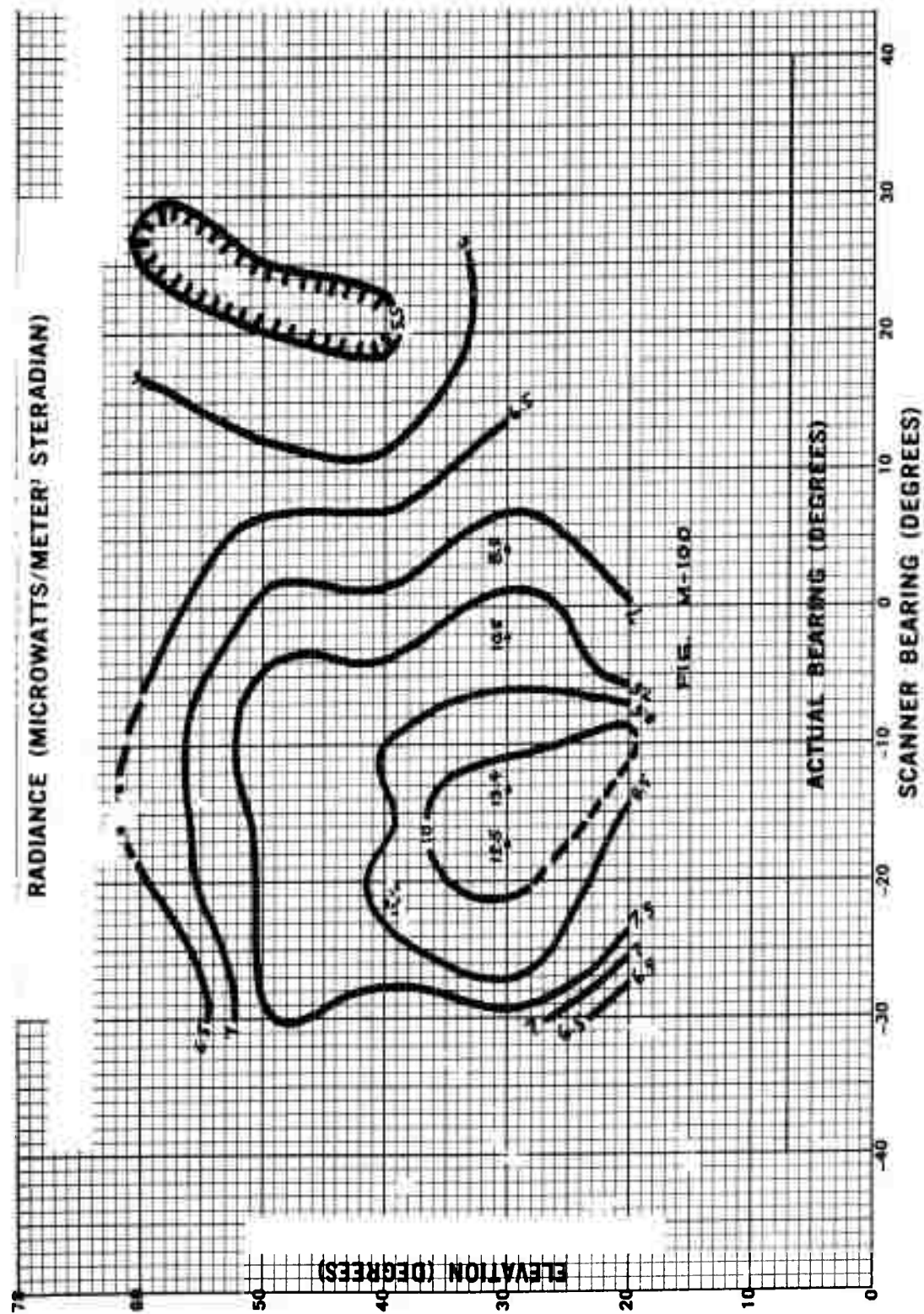


Figure 3.534 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, $H = 5,010$ sec.



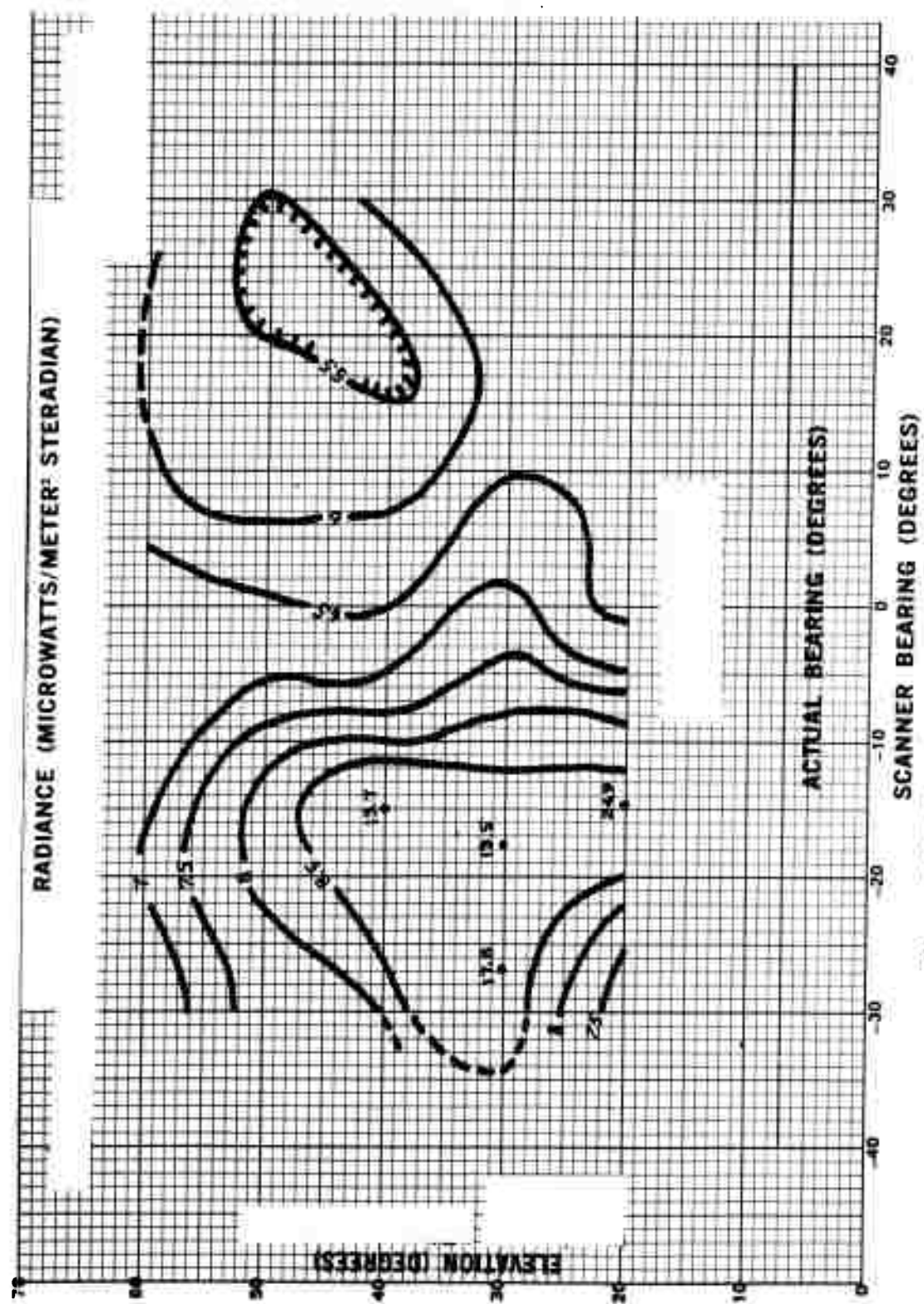


Figure 2.536 Sky radiance, Kettle I, King Fish, 0.558 to 0.558 micron, H + 5,214 sec.

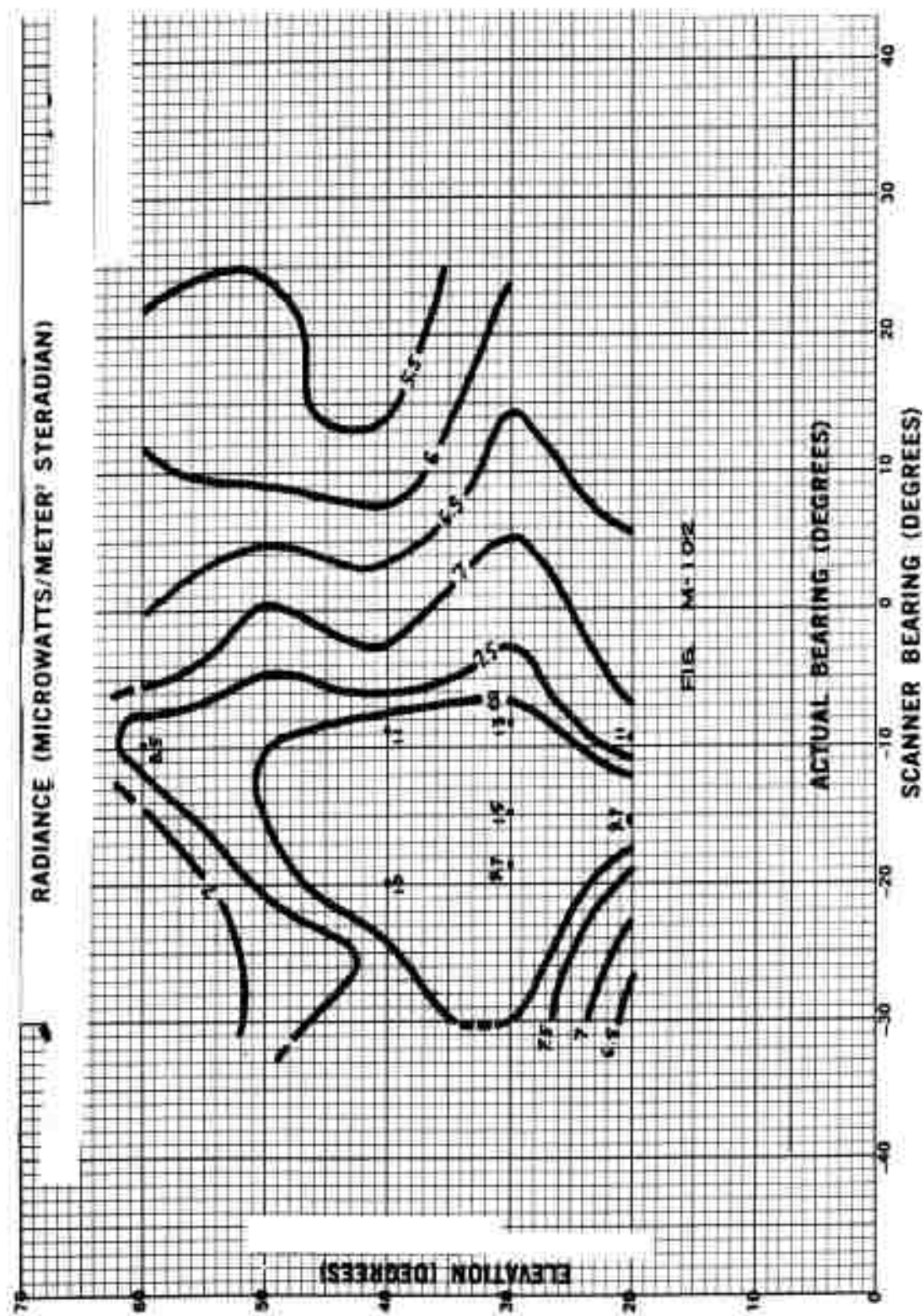


Figure 3.537 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H + 5,349 sec.

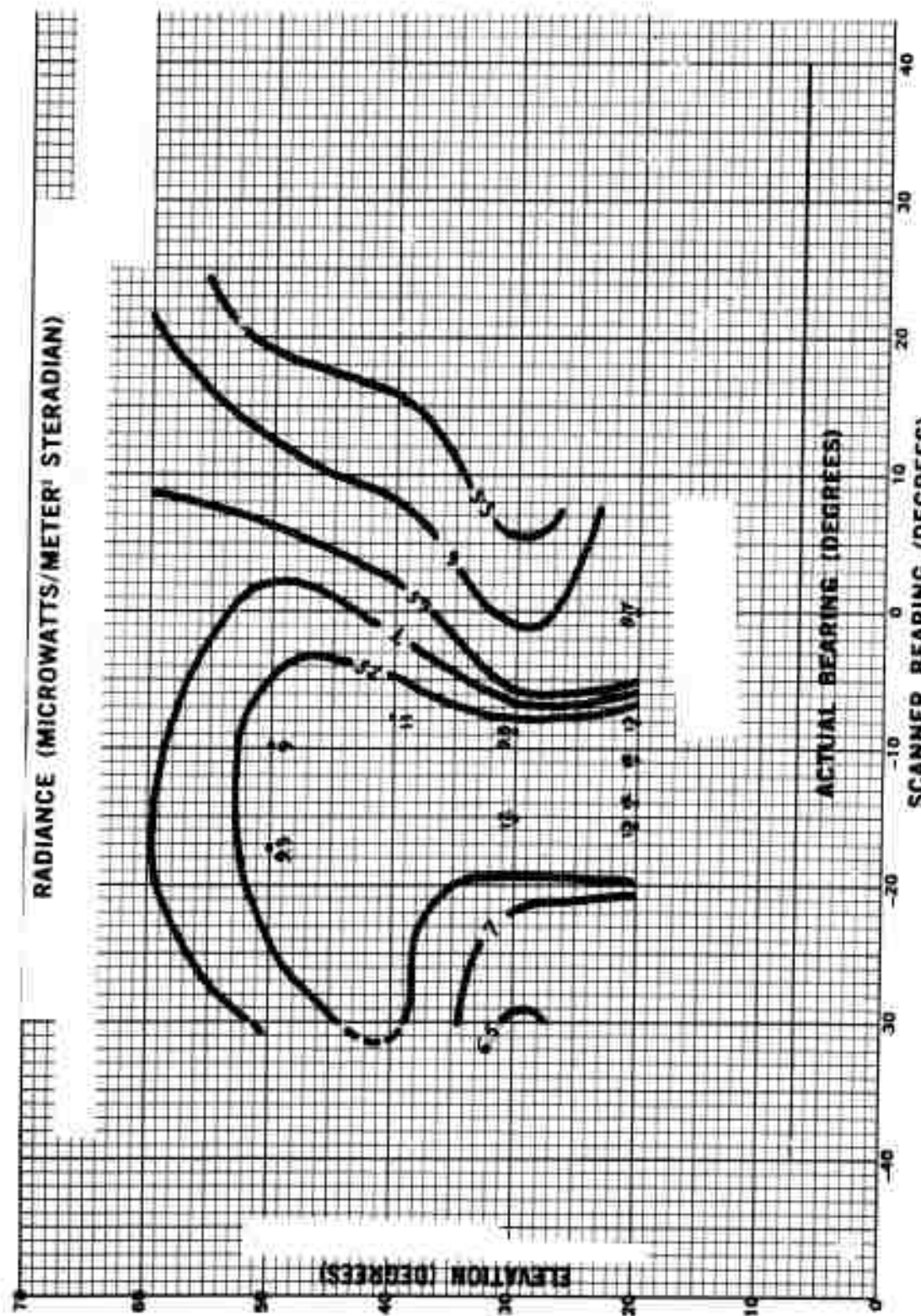


Figure 3.335 Sky radiance, Kettle 1, King Fish, 0.338 to 0.558 micron, H + 5.495 sec.

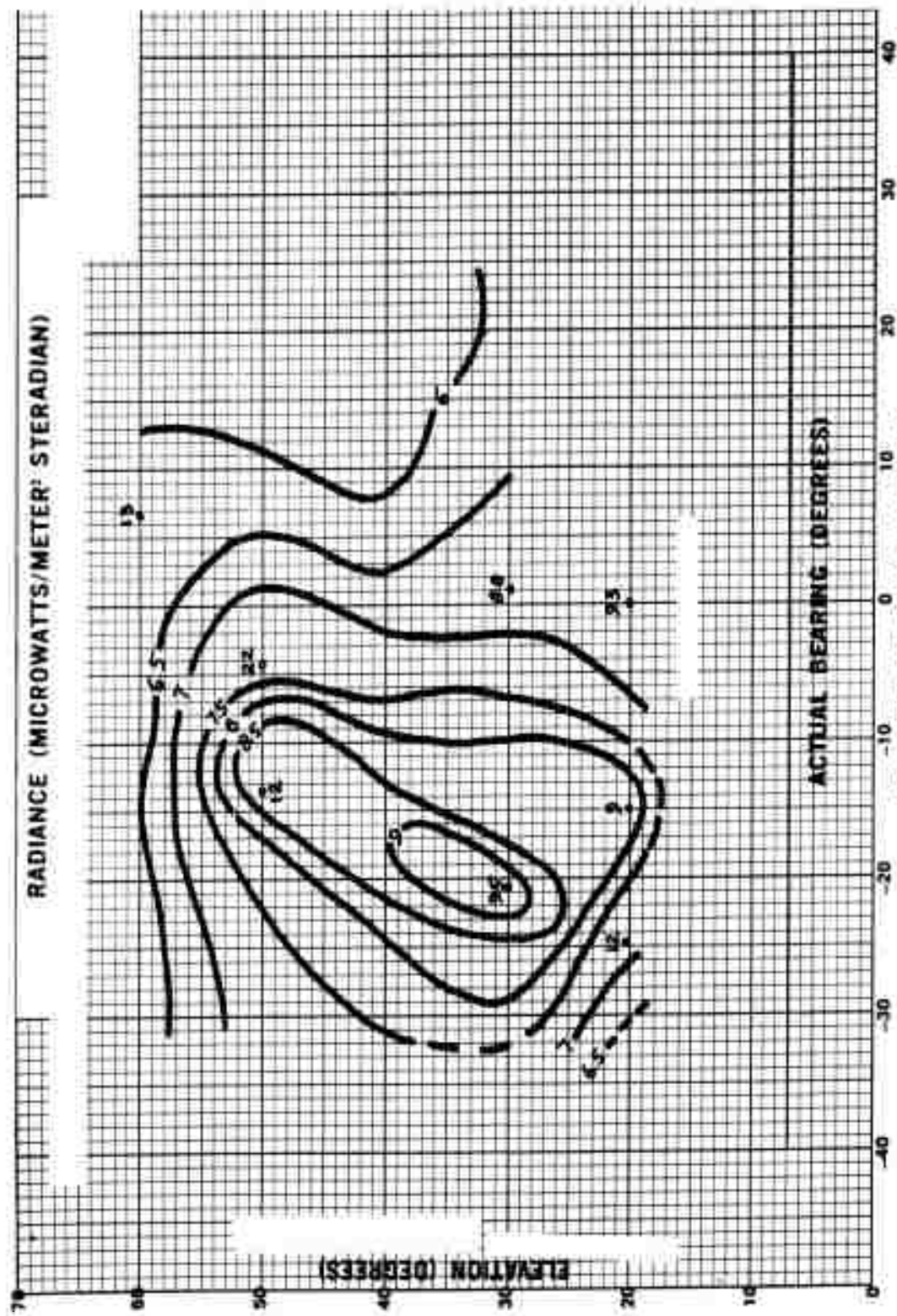


Figure 3.539 Sky radiance, Kettle 1, King Fish, 0.355 to 0.556 micron, H + 5.020 sec.

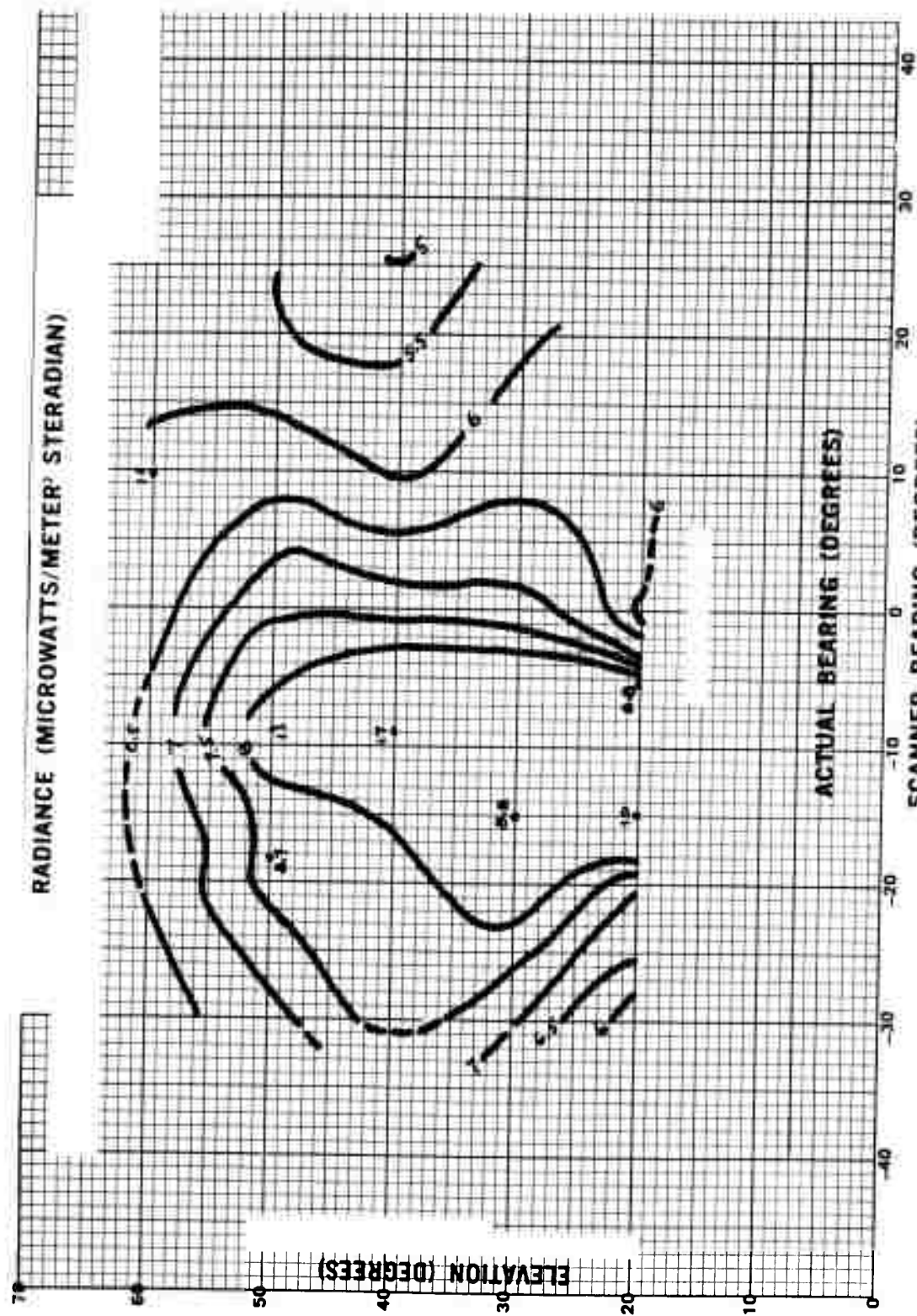


Figure 3.540 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H+5,724 sec.

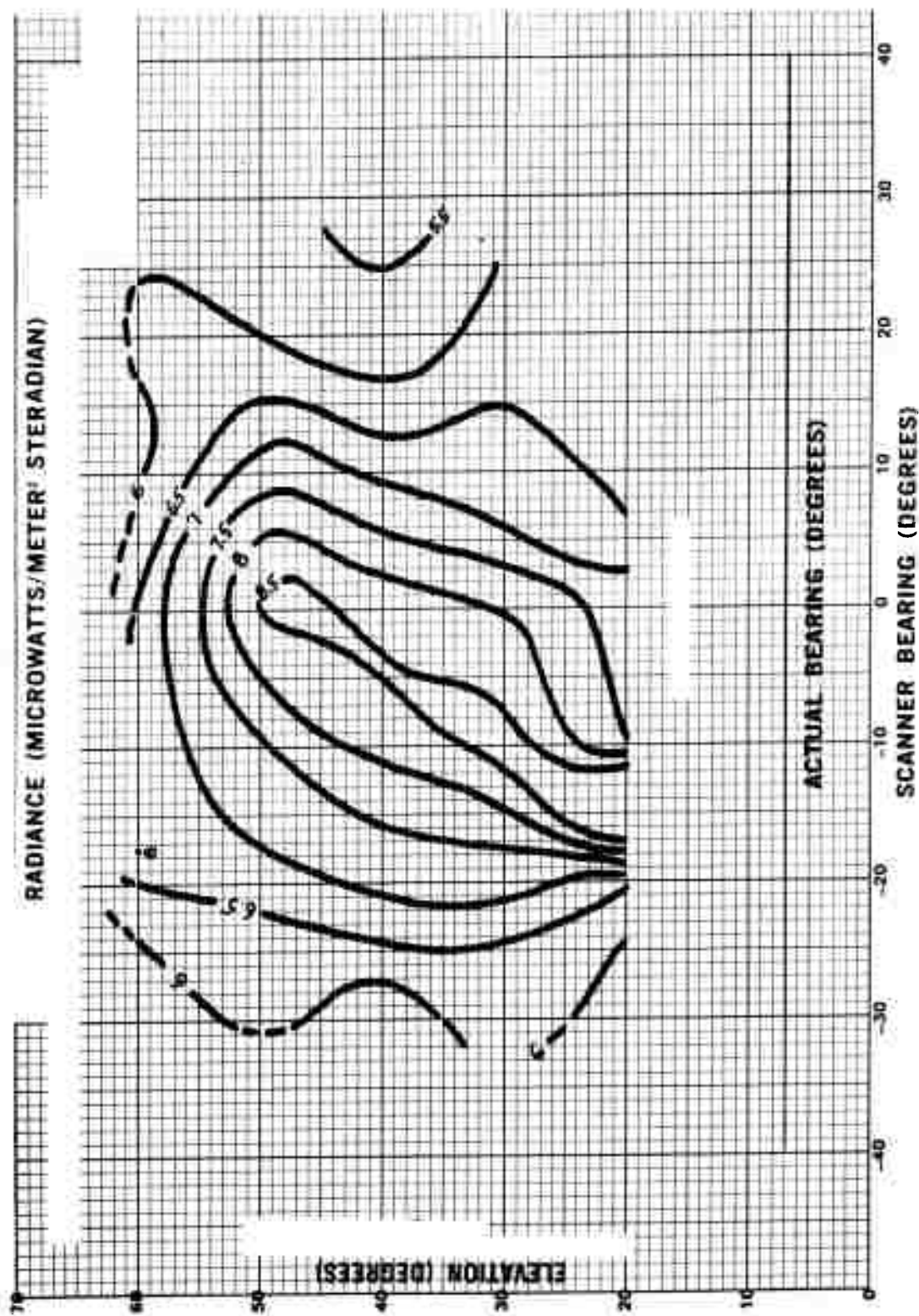


Figure 3.541 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H+6,231 sec.

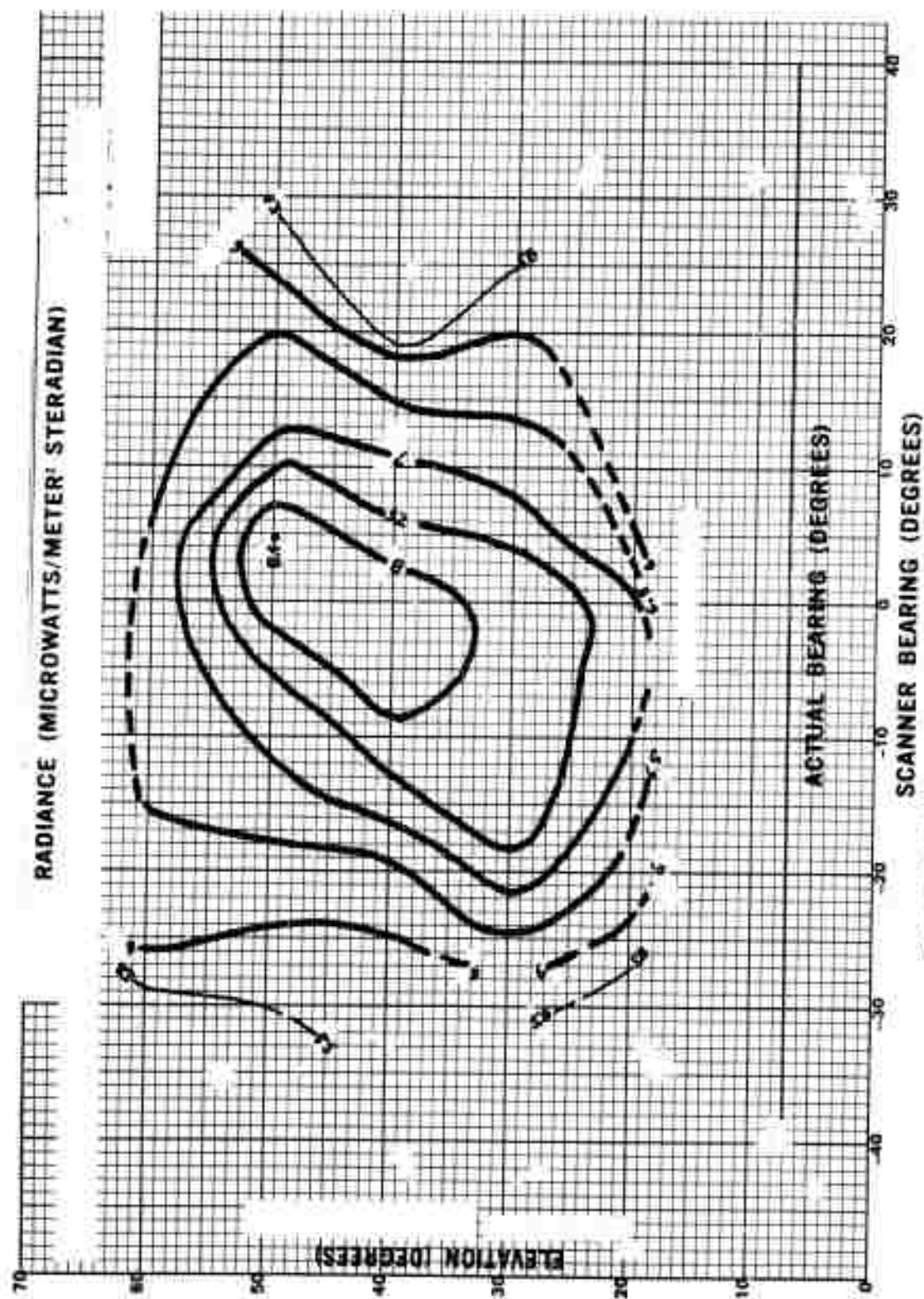


Figure 3.543 Sky radiance, Kettio 1, King Fish, 0.358 to 0.558 micron, H = 0.368 sec.

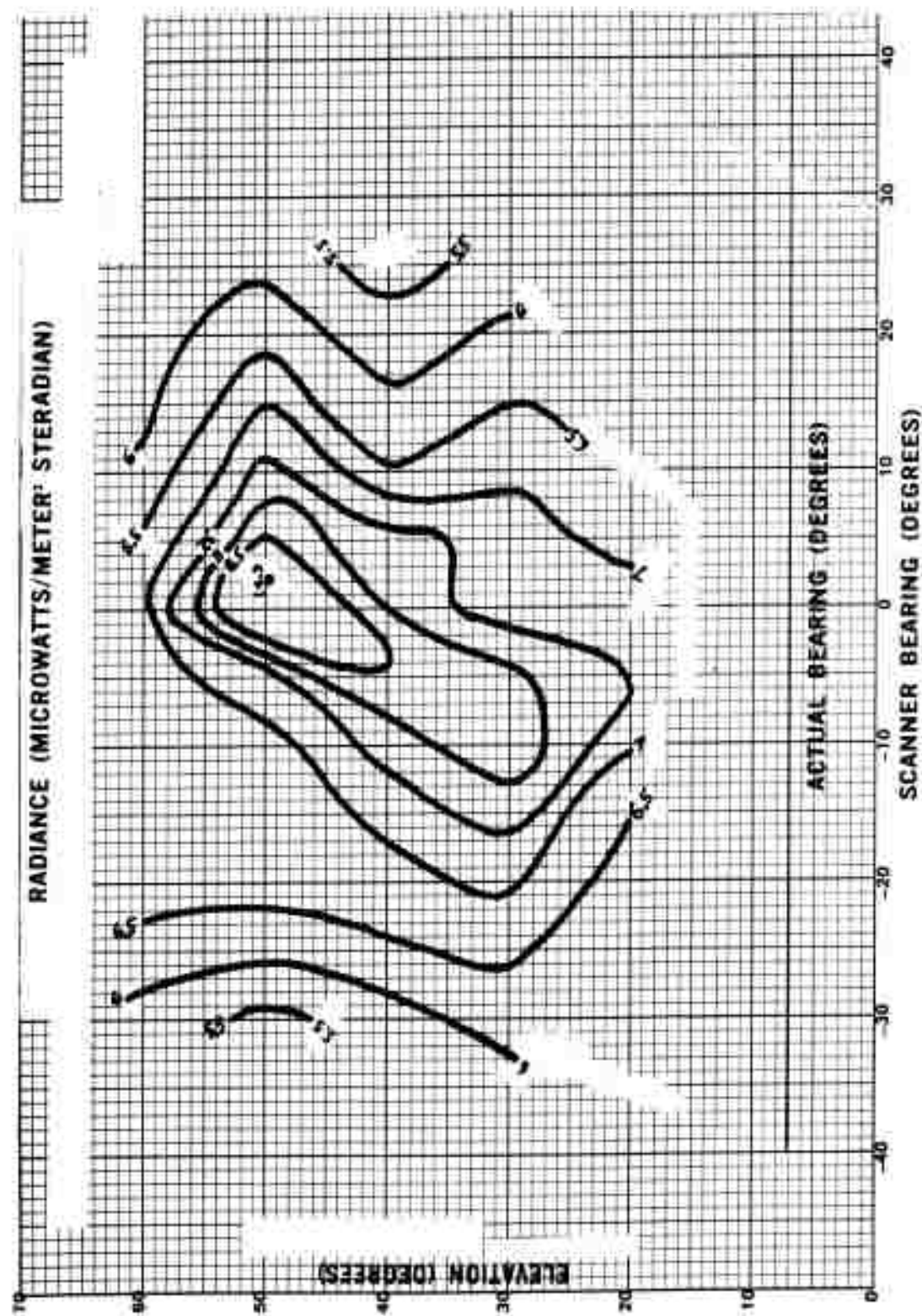


Figure 0.643 Sky radiance, Kettle I, King Fish, 0.358 to 0.656 microns, H + 6.434 sec.

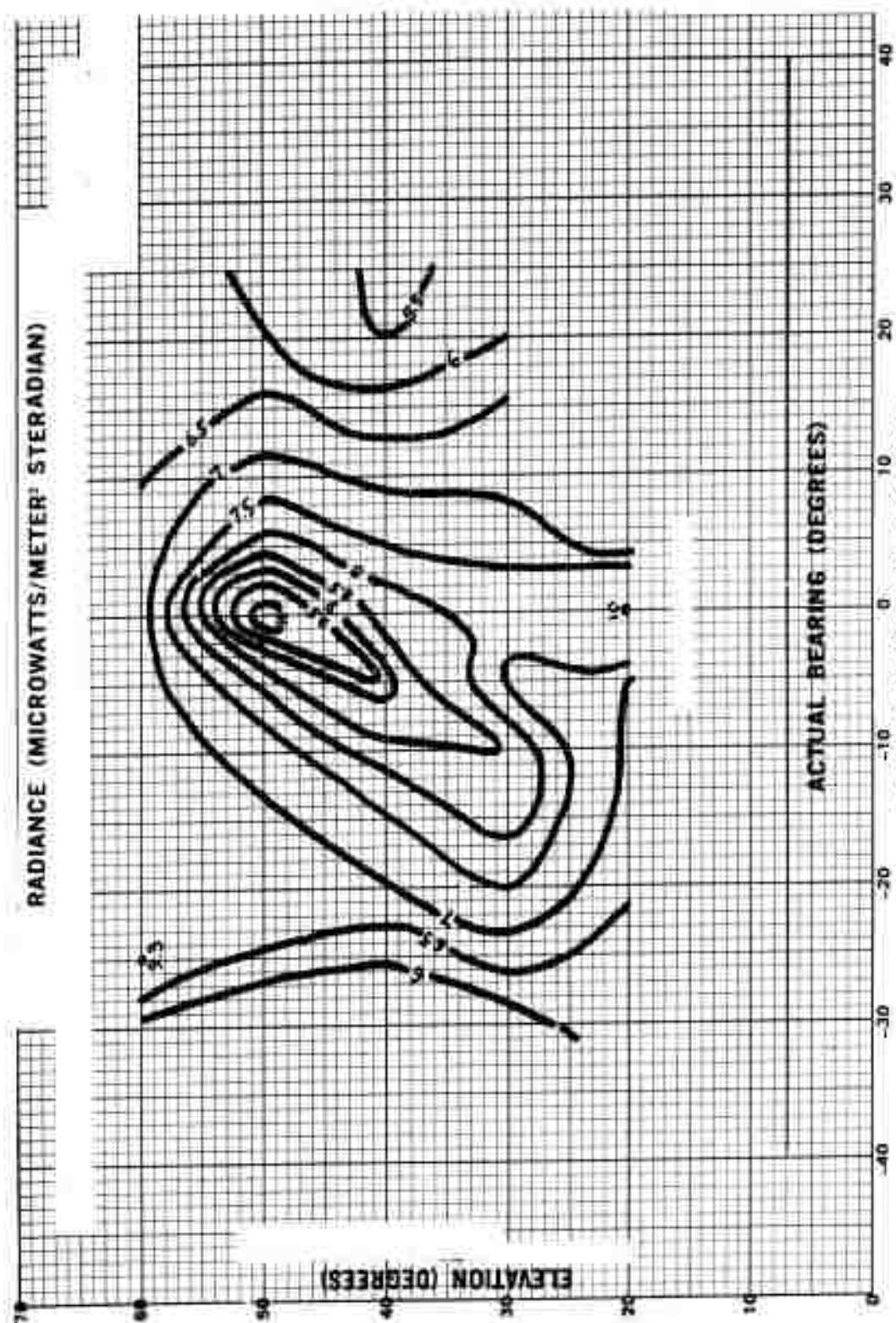


Figure 3.543 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron, H+6.705 sec.

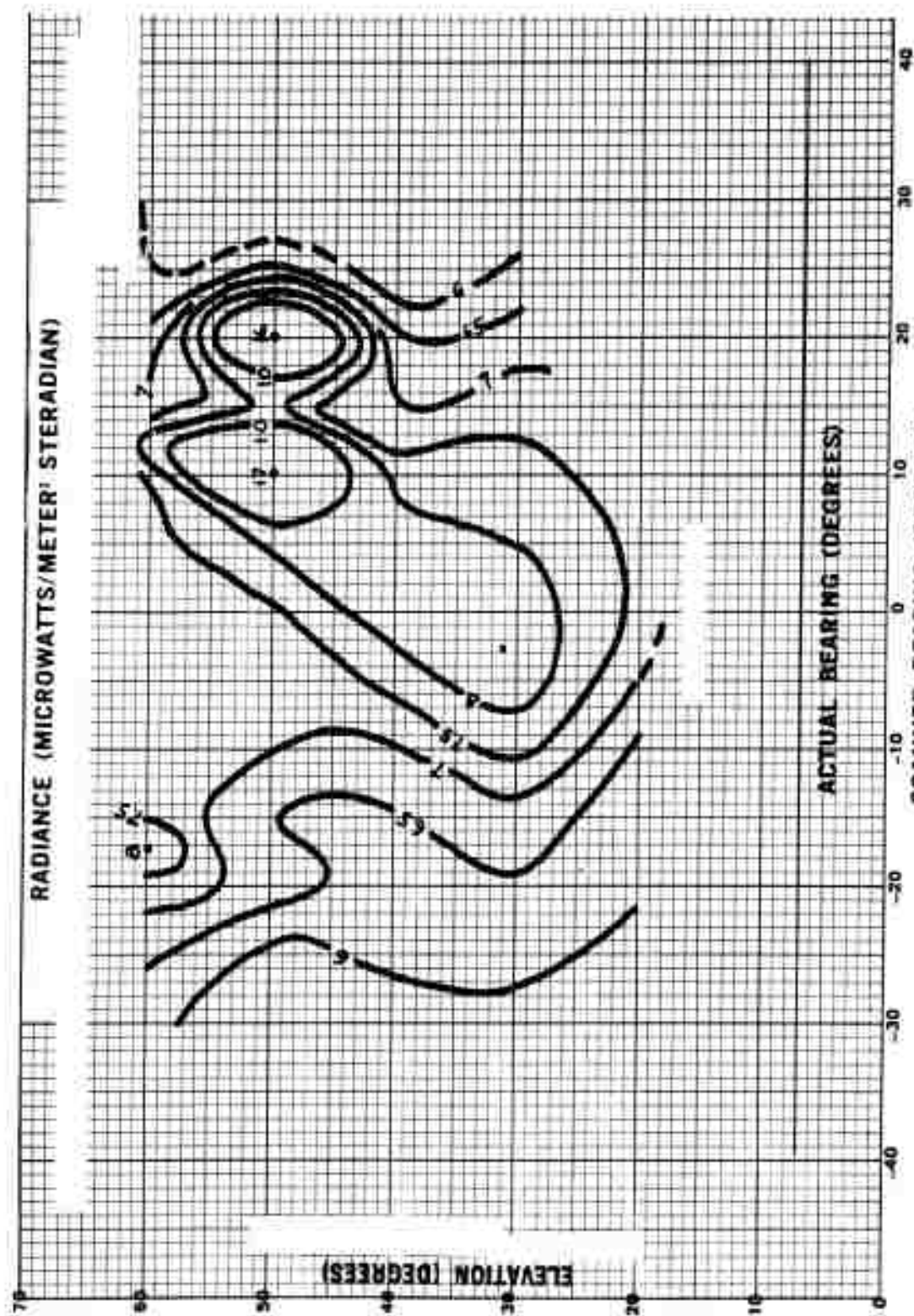


Figure 3.546 Sky radiance, Kettle I, King Fish, 0.356 to 0.558 micron, H + 6.841 sec.

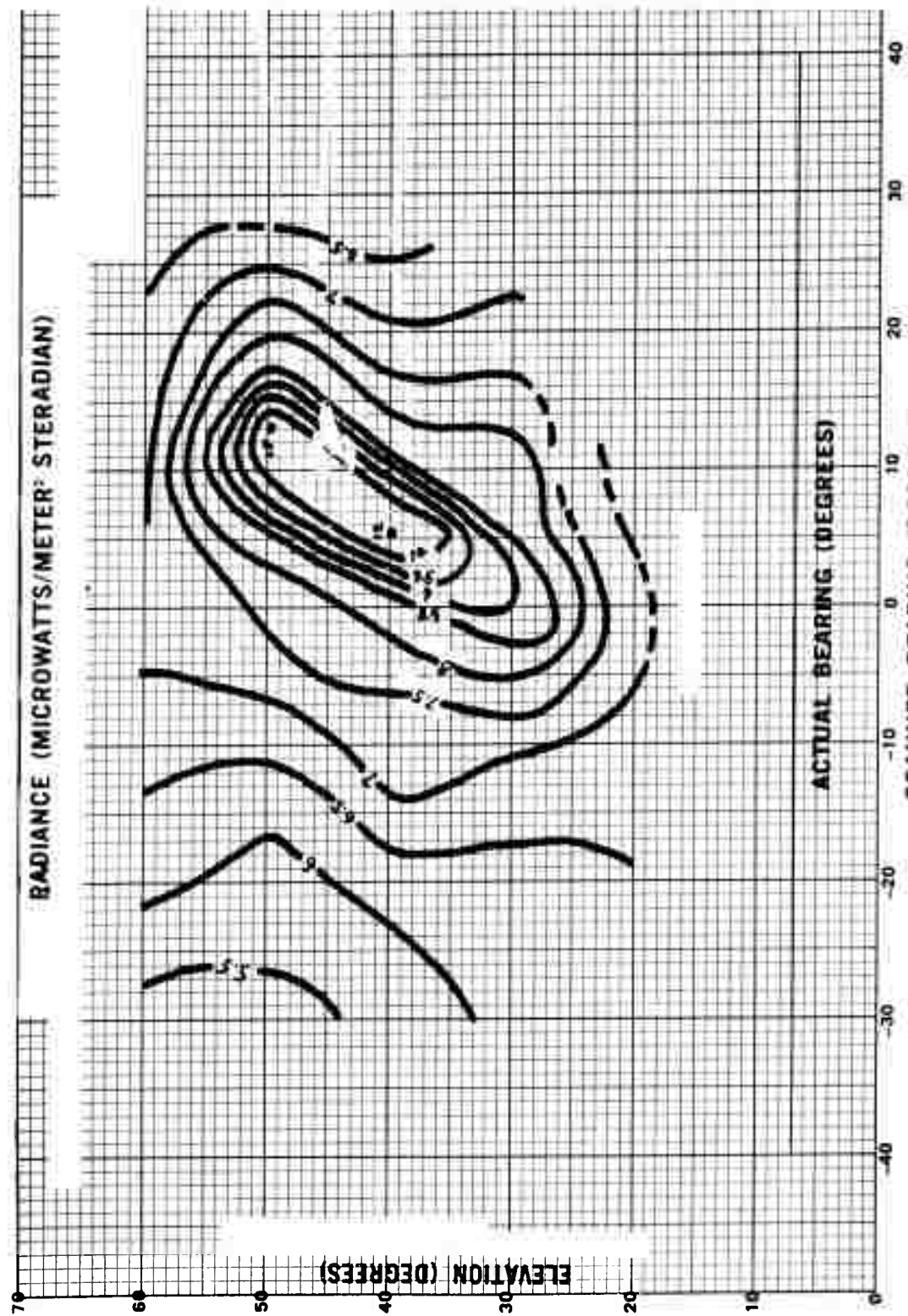


Figure 3.547 Sky radiance, Kettle I, King Fish, 0.355 to 0.55 micron, H + 6.976 sec.

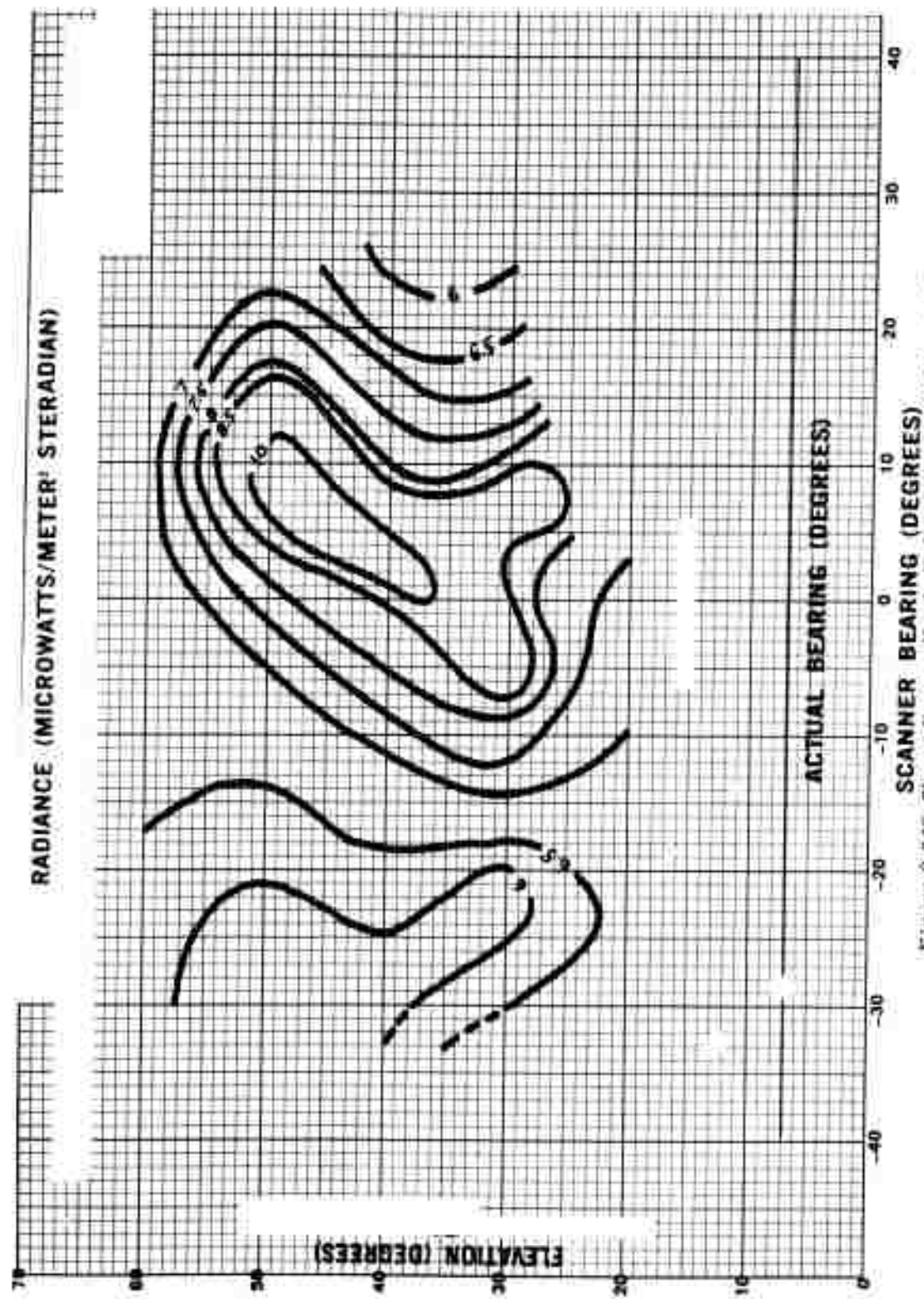


Figure 3.545 Sky radiance, Kettle I, King Fish, 0.358 to 0.558
 m rad, $\pi + 7,112$ sec.

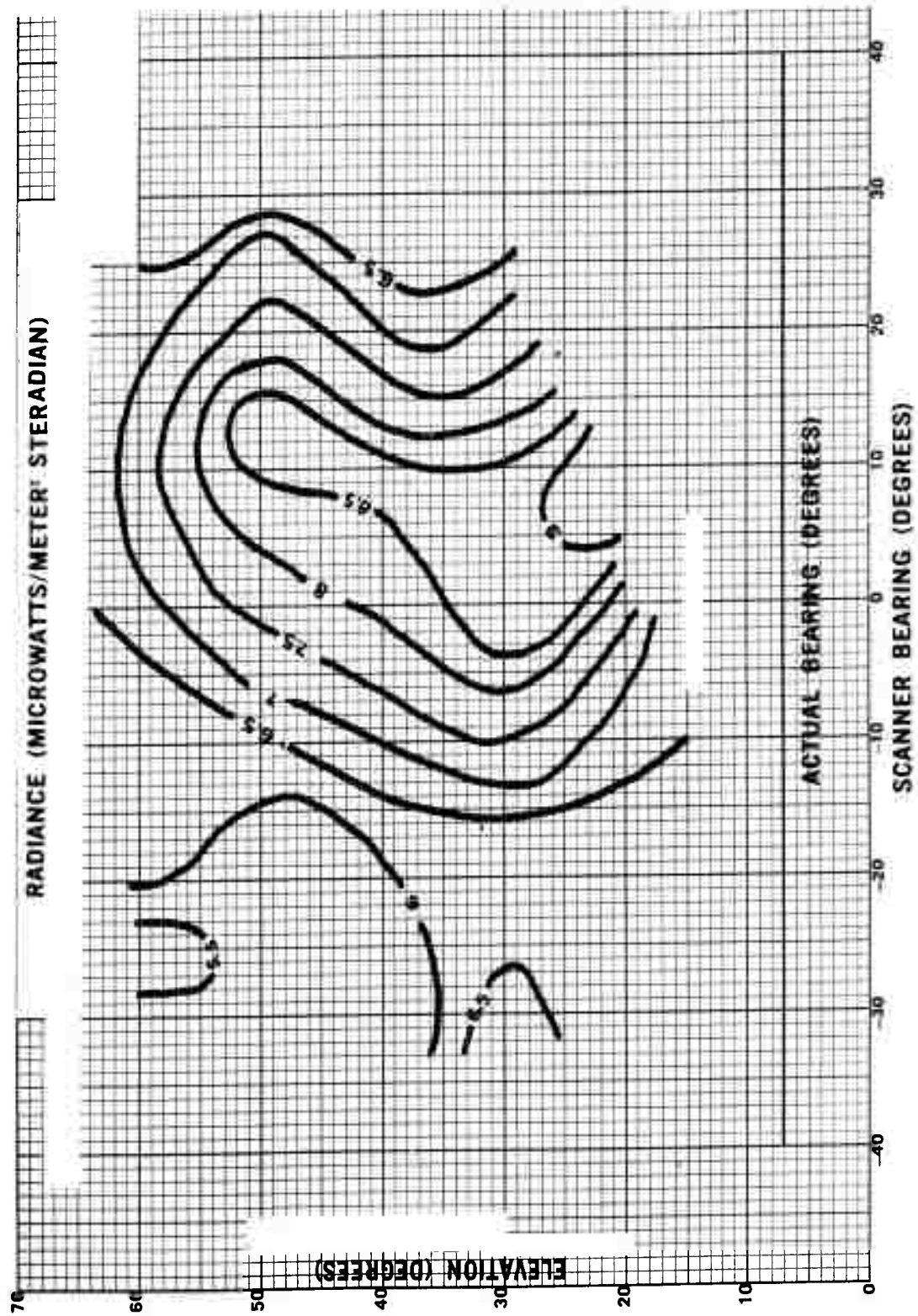


Figure 3.549 Sky radiance, Kettle I, King Fish, 0.358 to 0.558 micron., H+7,315 sec.

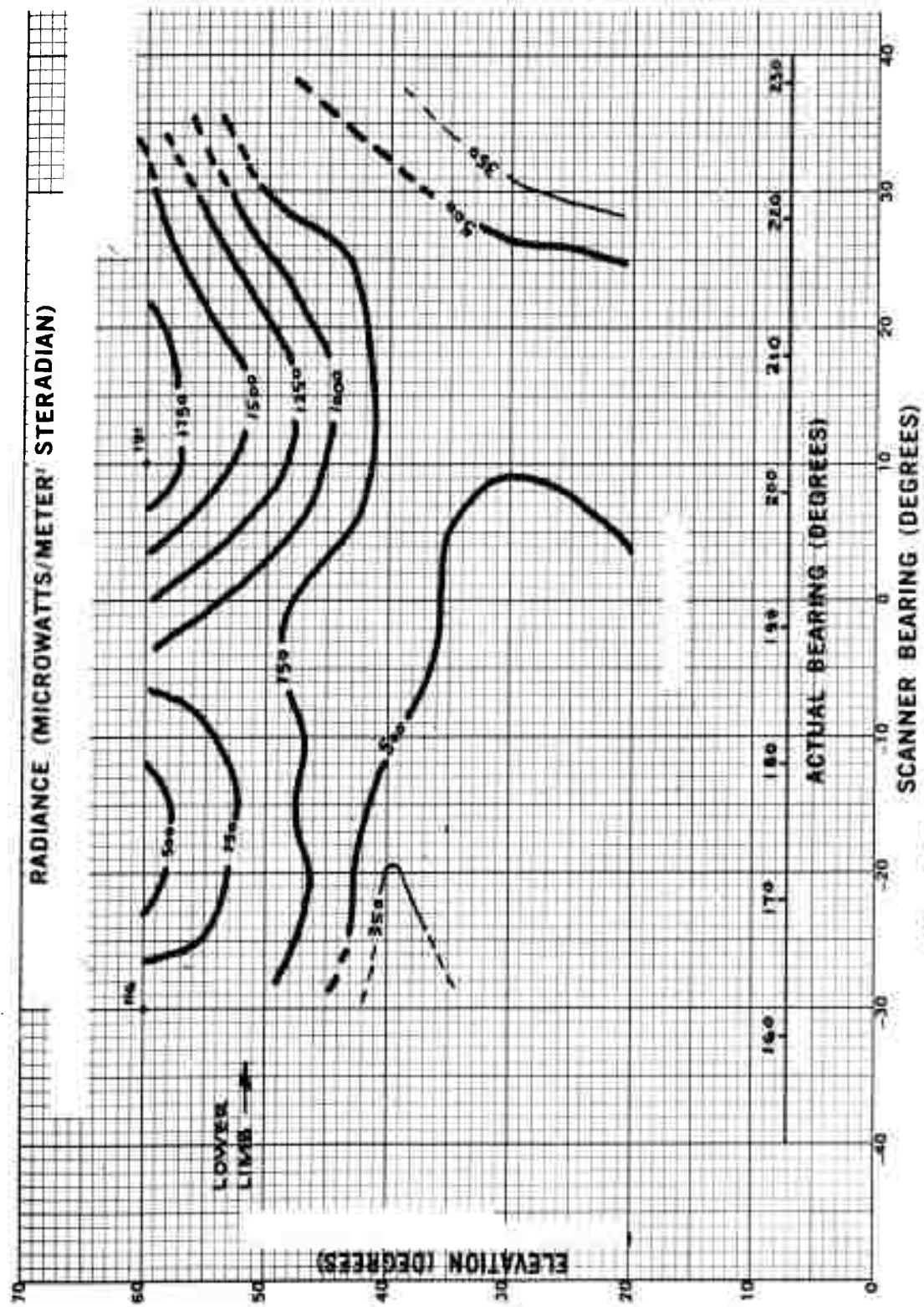


Figure 3.550 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 microns, H+75 sec.

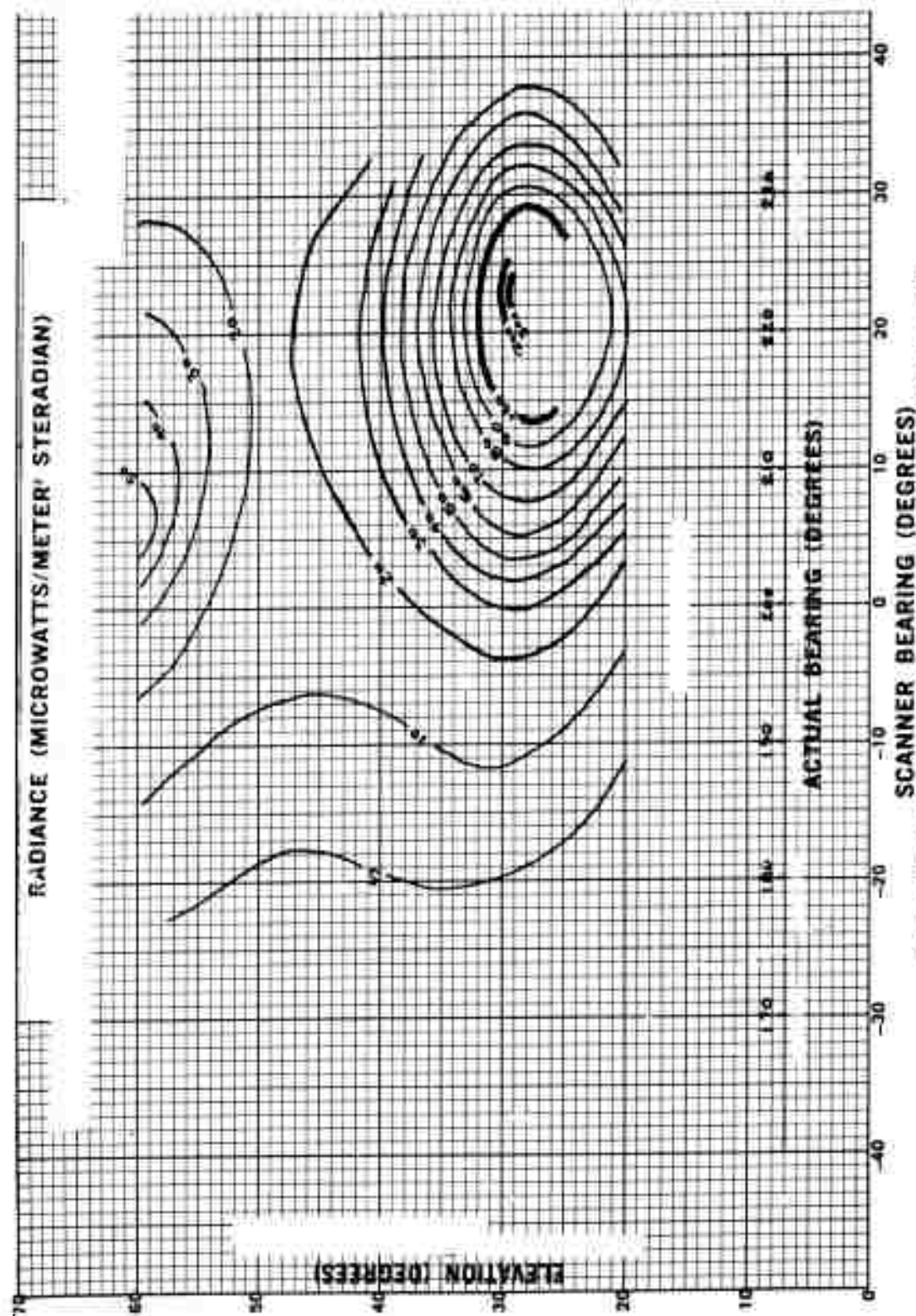


Figure 3.531 Sky radiance, Kettis I, King Fish, 0.521 to 0.567 micron, H+142 sec.

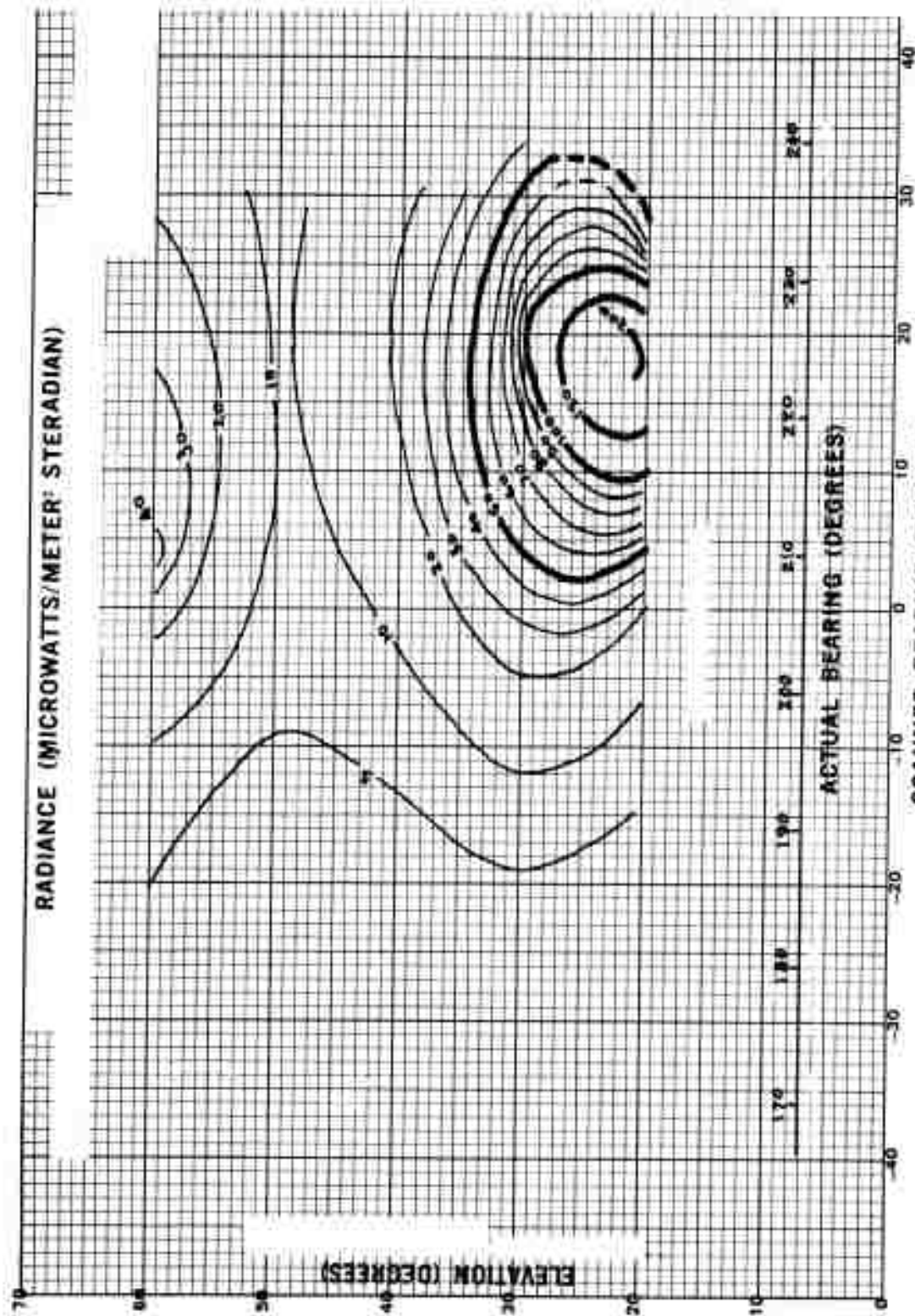


Figure D.552 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 210 sec.

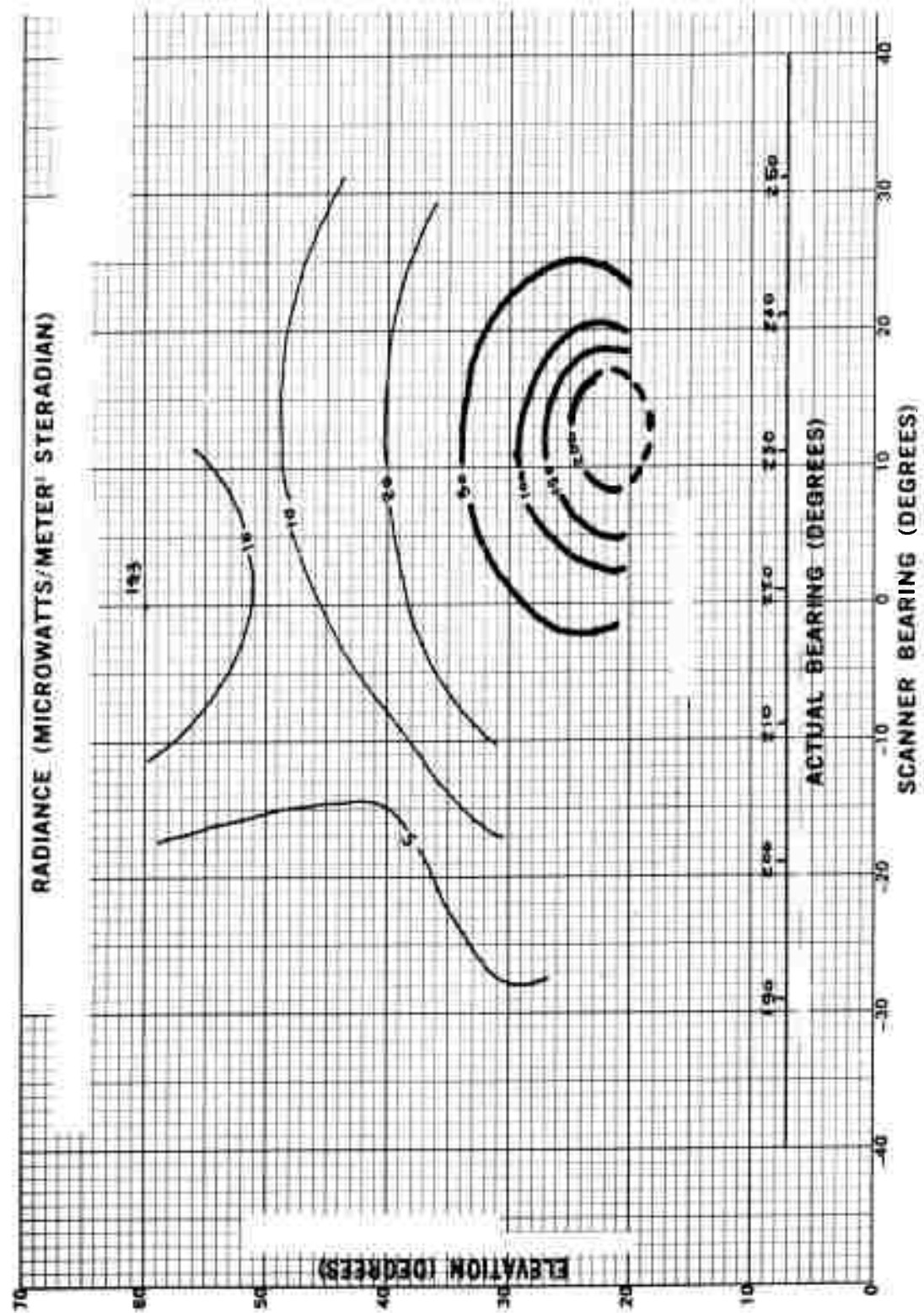


Figure 3.553 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 278 sec.

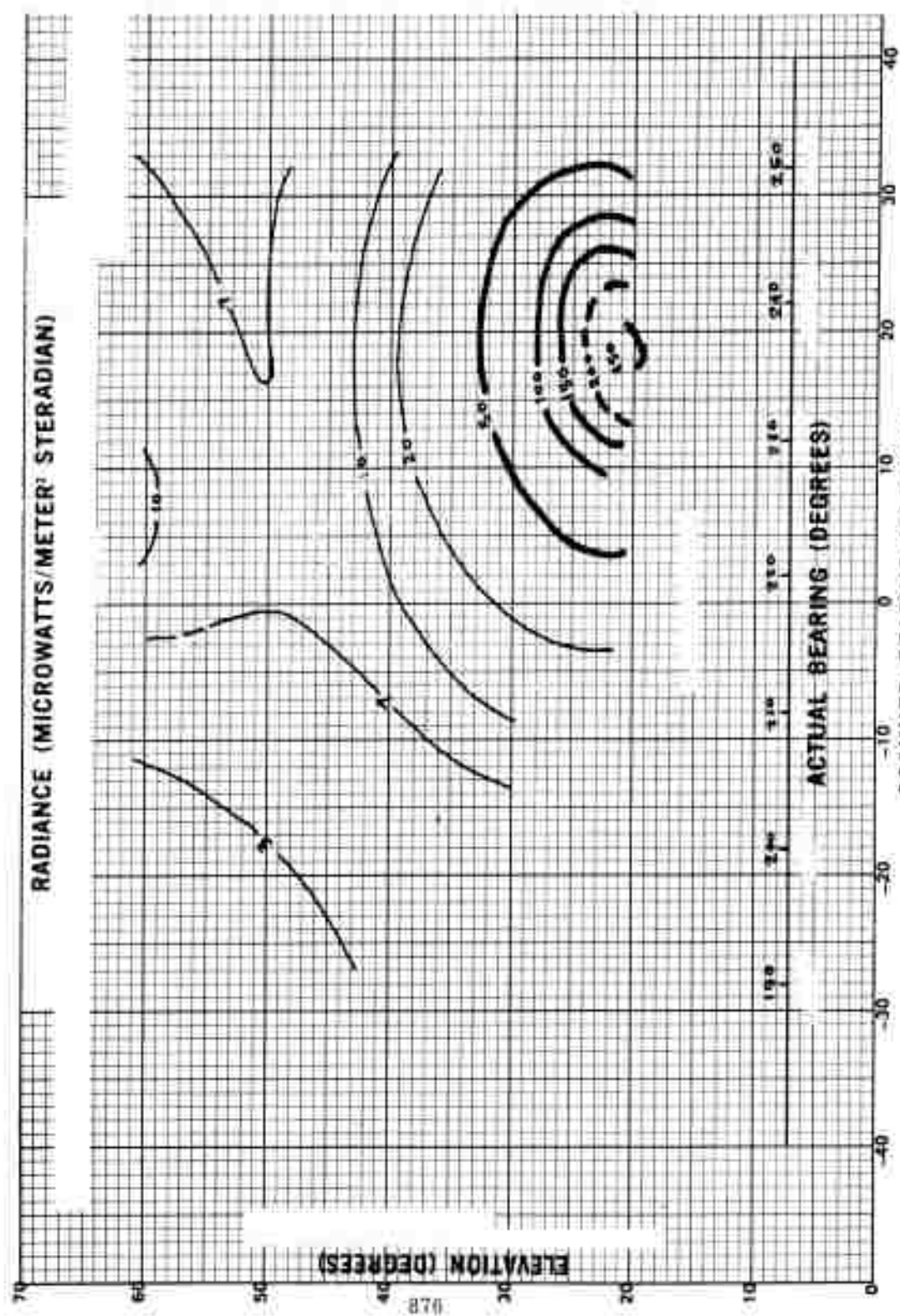


Figure 3-534 Sky radiance, Kettle I, King Fish, 0.521 to 0.587 microns, H+345 sec.

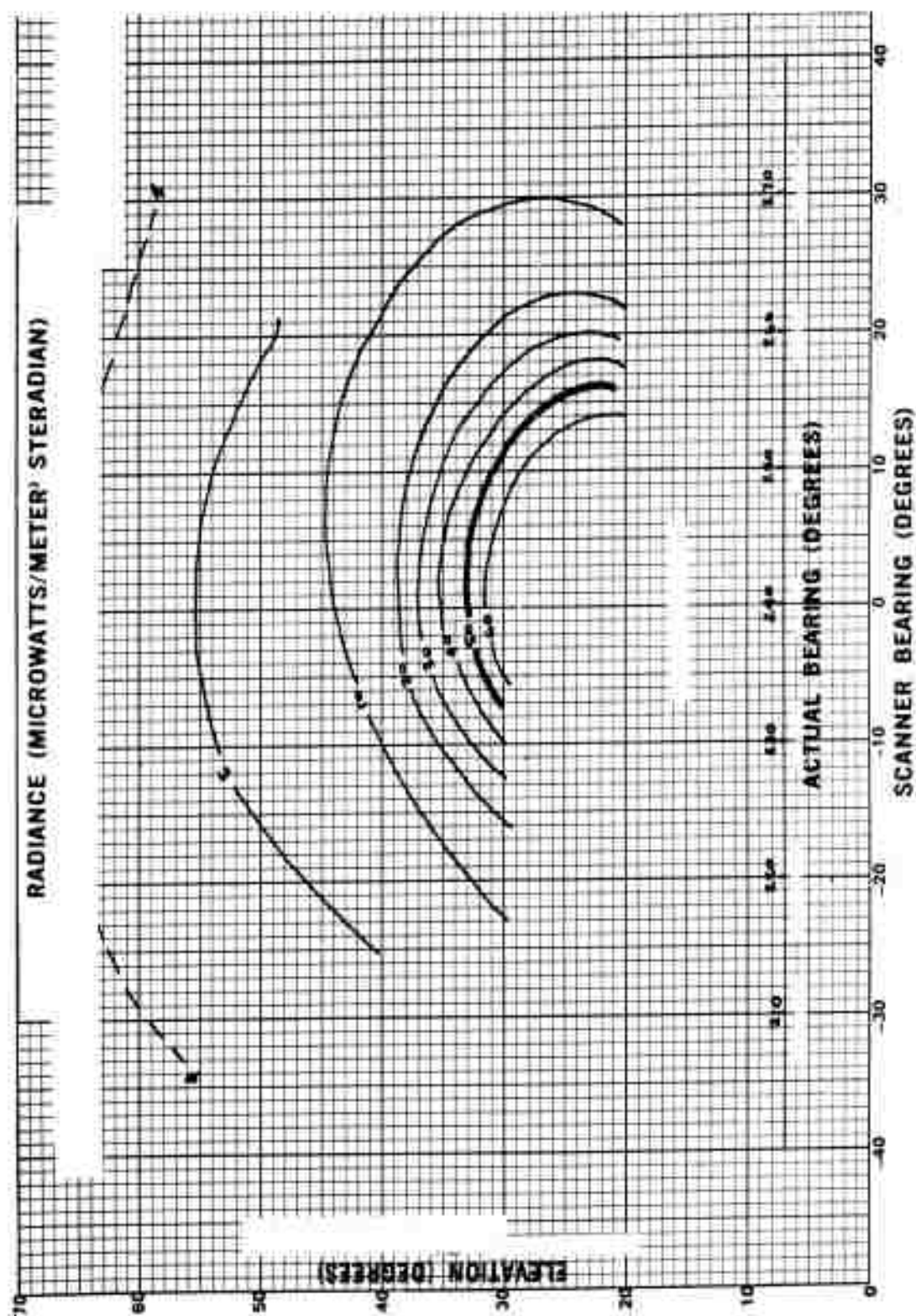


Figure 3.056 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H+413 sec.

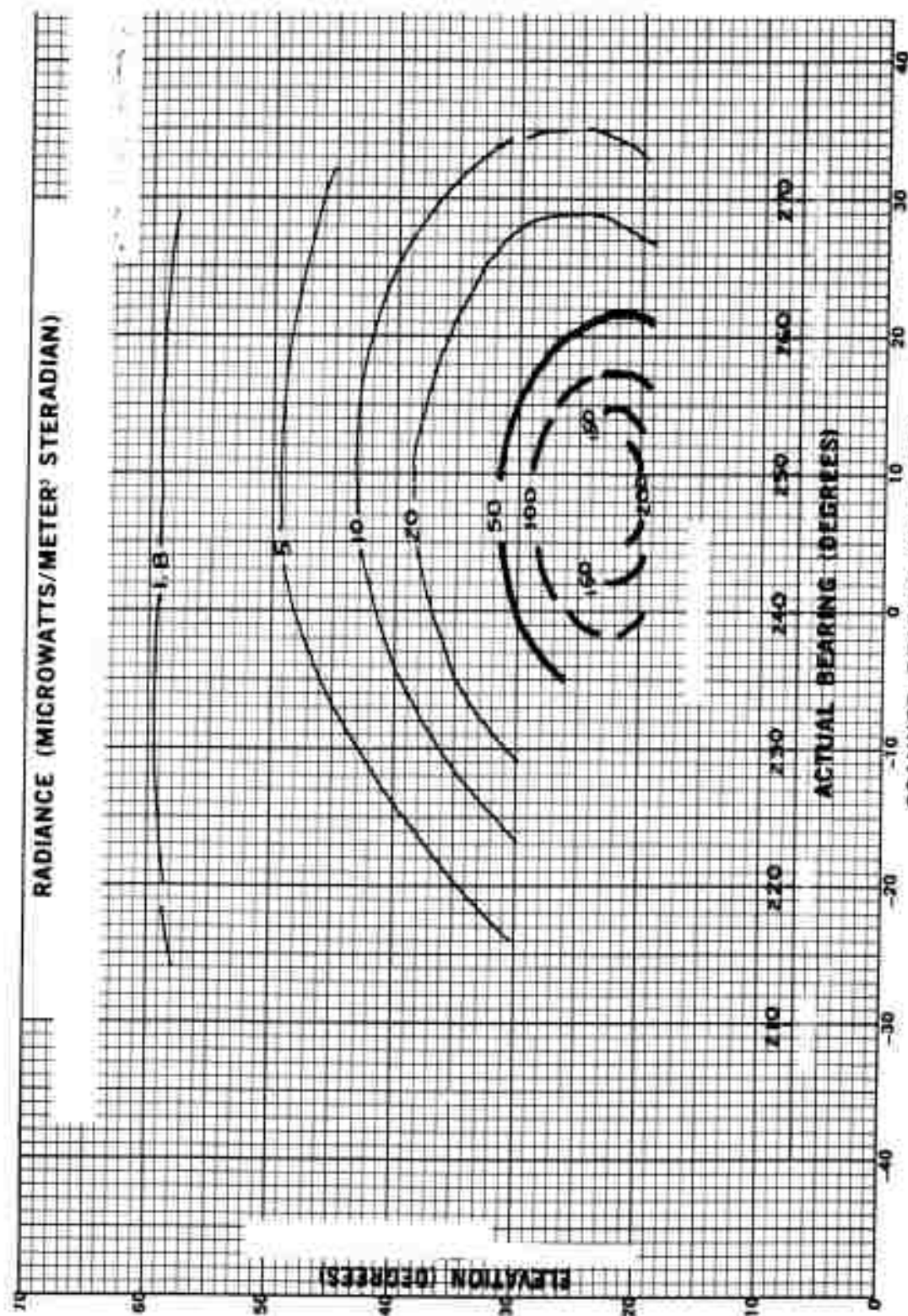


Figure 3.556 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 481 sec.

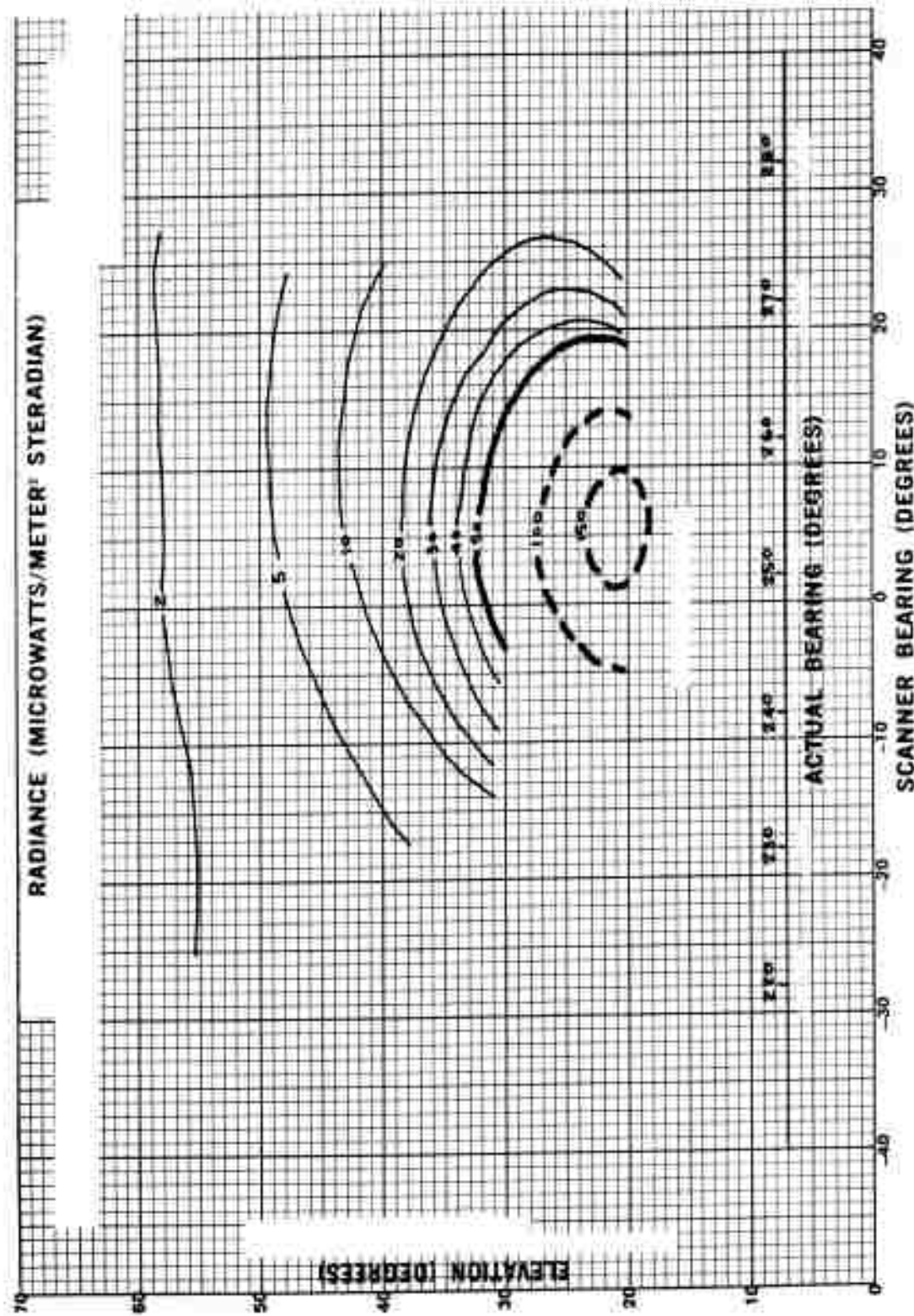


Figure 3.557 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H+548 sec.

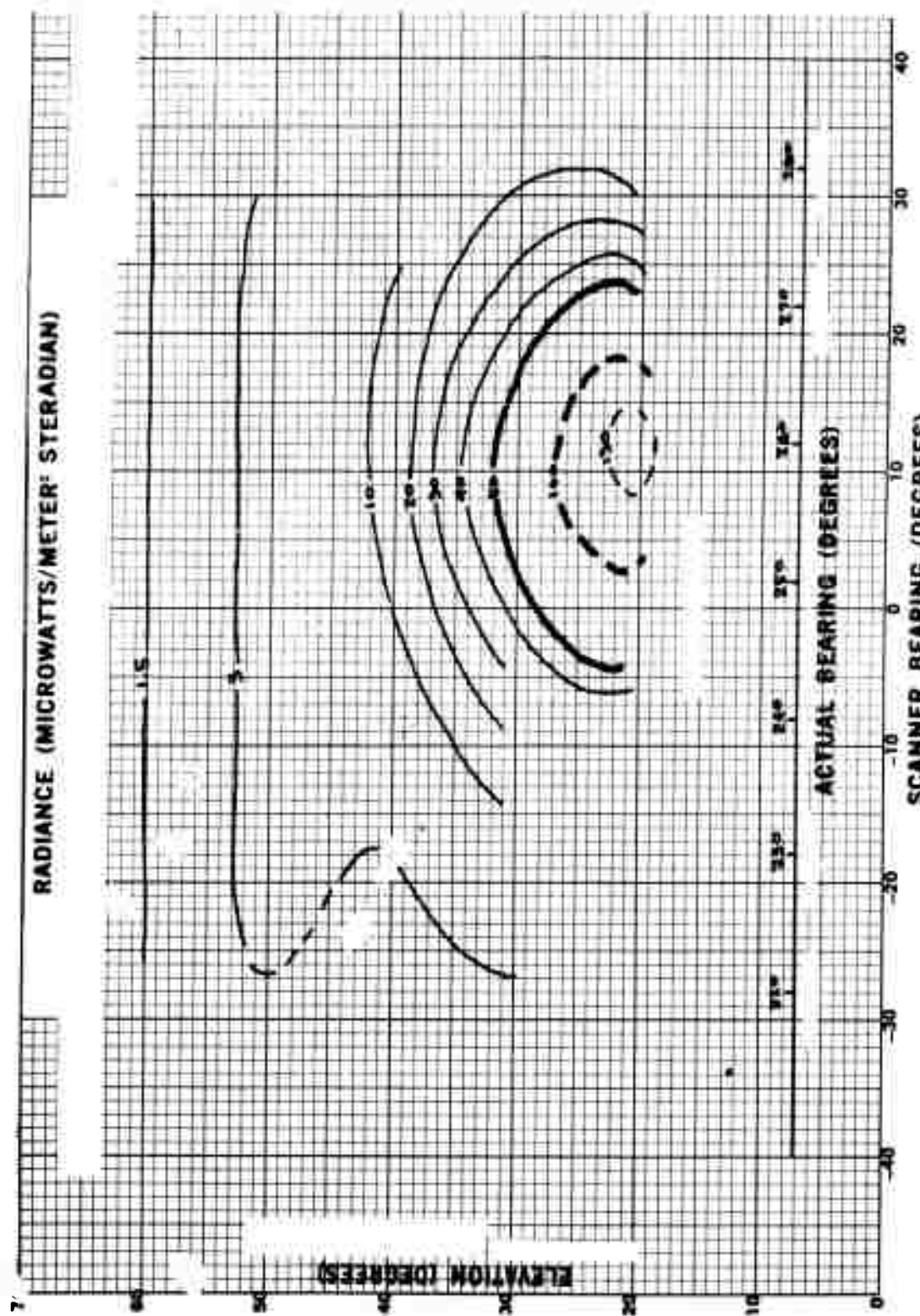


Figure 3.556 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H+610 sec.

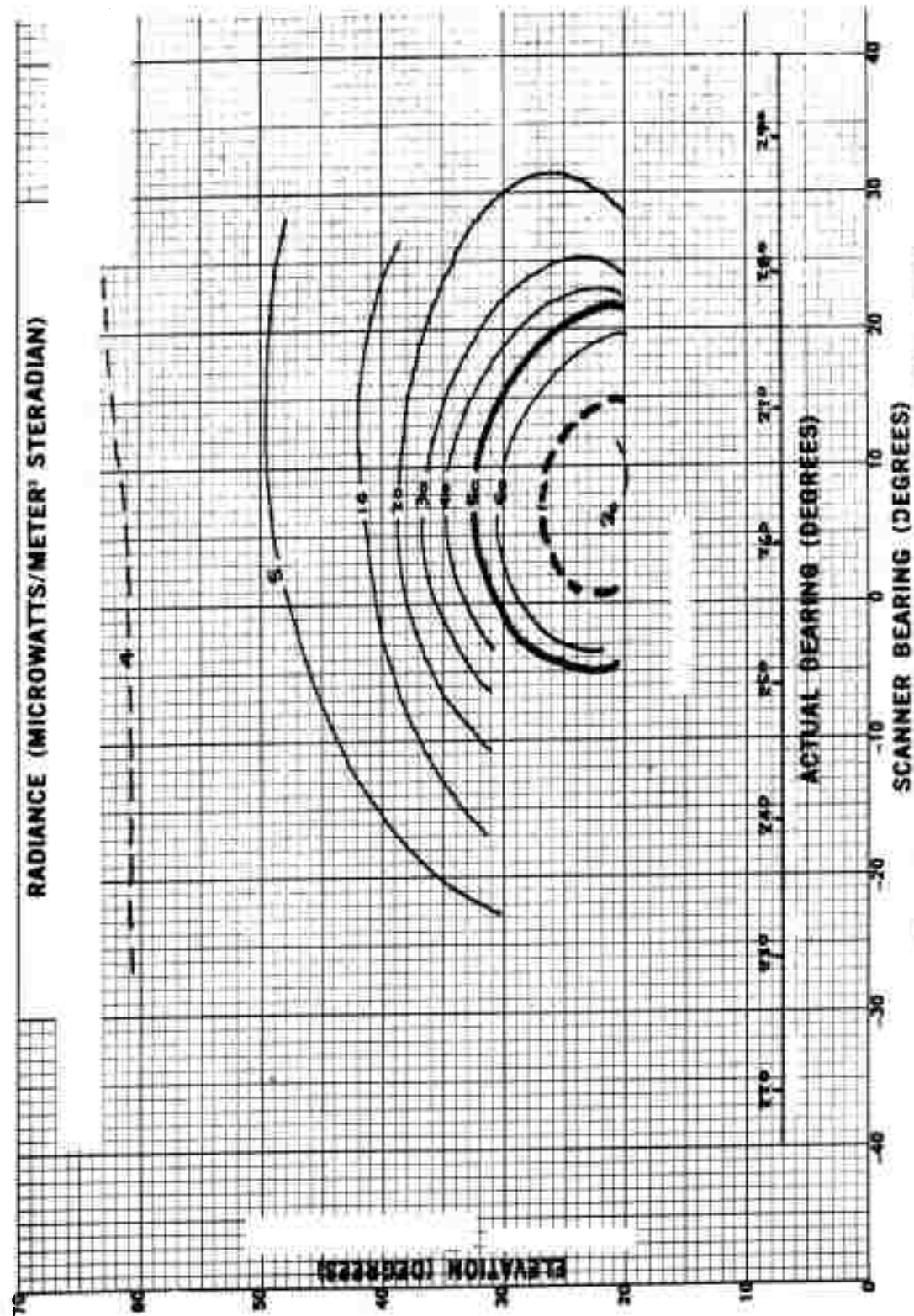


Figure 3.559: Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H+684 sec.

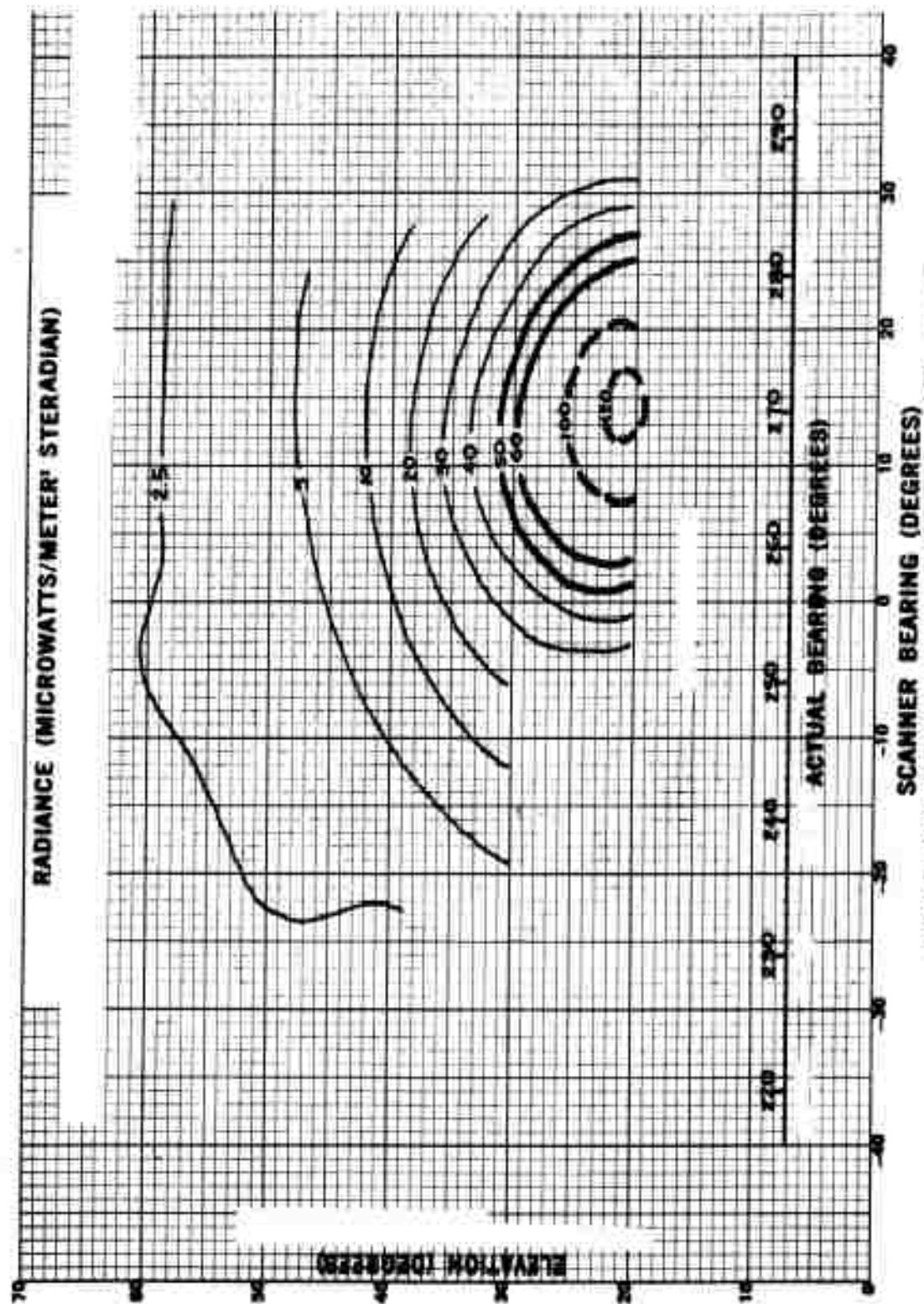


Figure 3.560 Sky radiance, Kettle 1, King Fish, 0.521 to 0.567 micron, H + 7.01 sec.

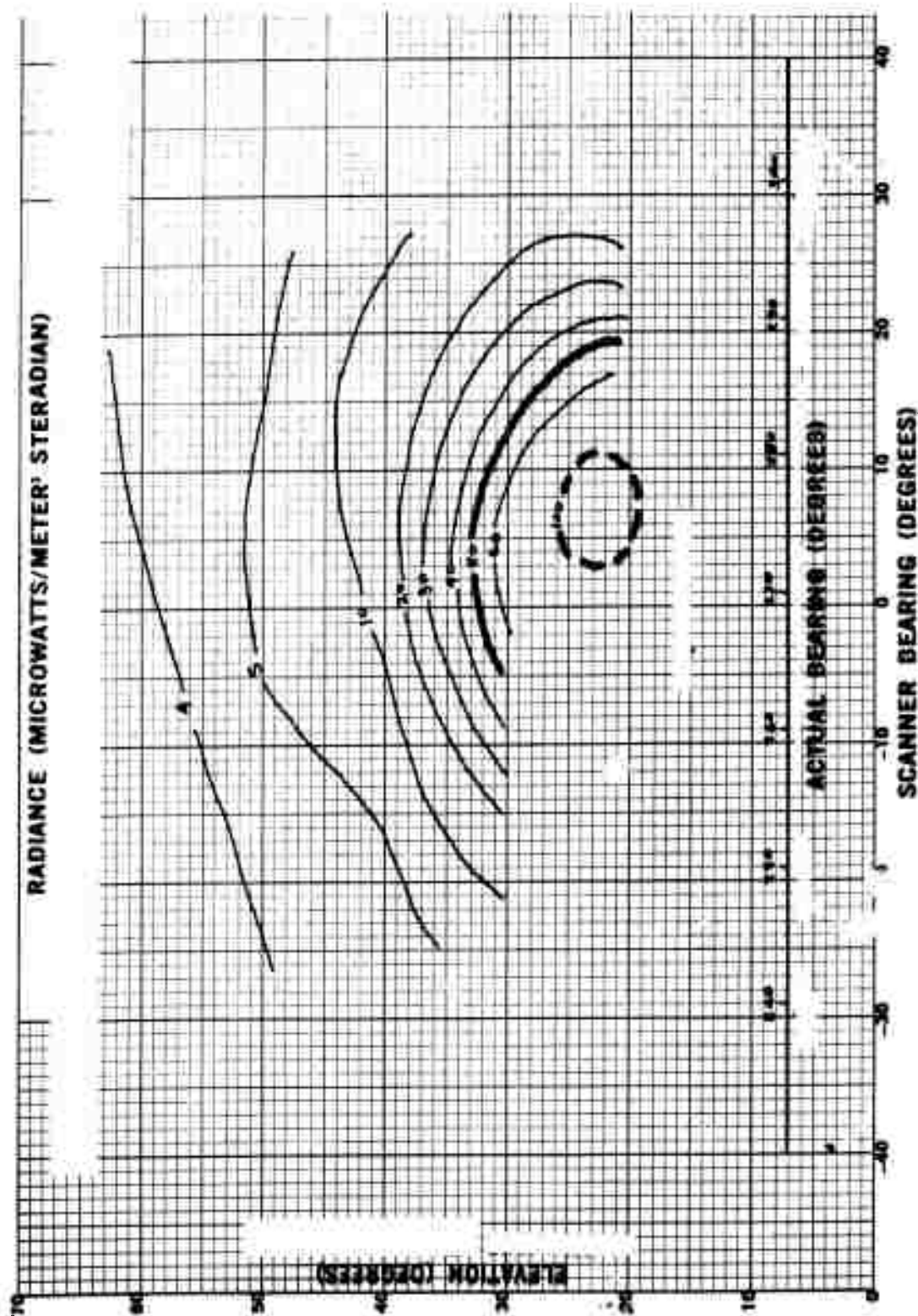


Figure 3.561 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H+819 sec.

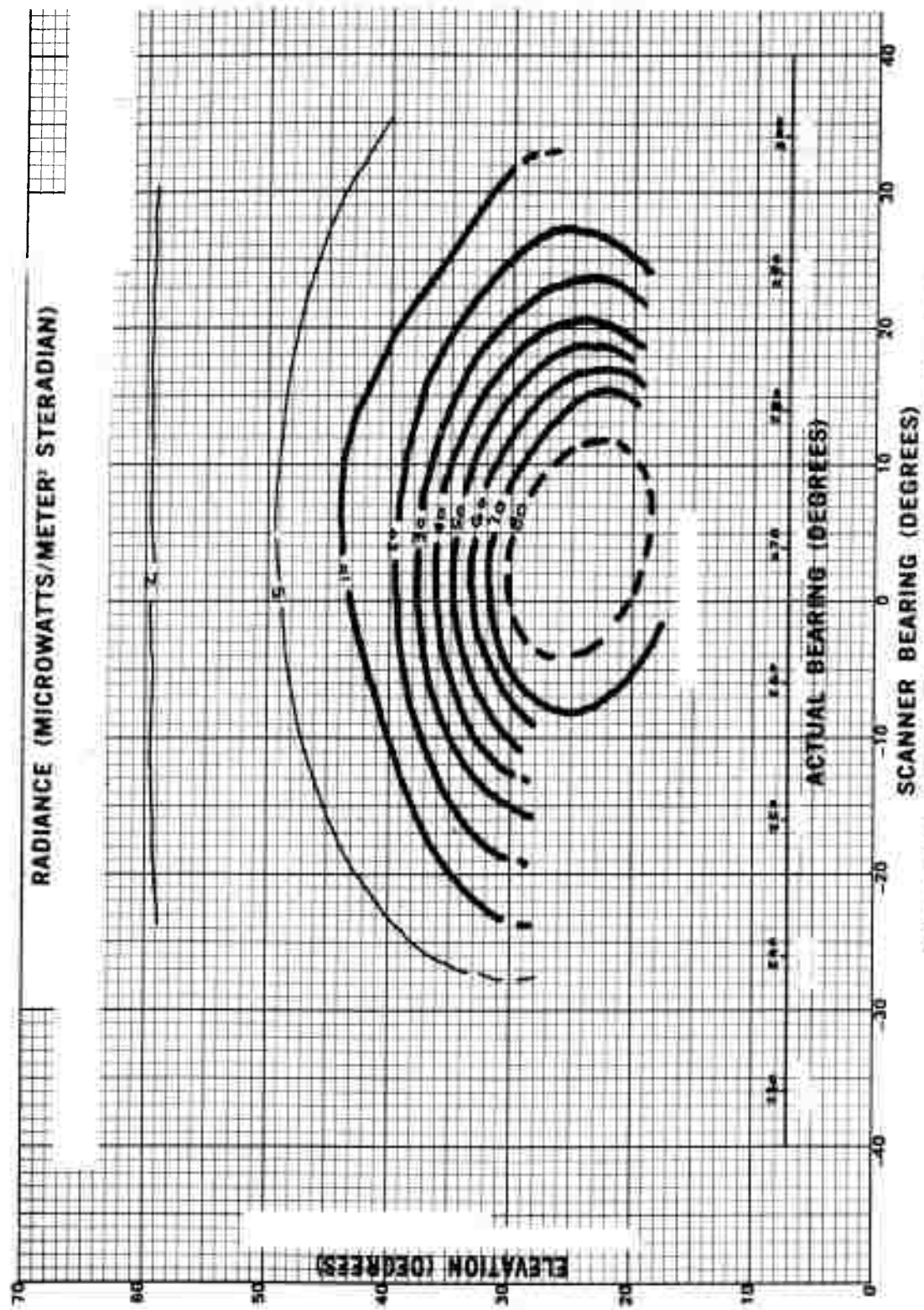


Figure 3.562 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H+897 sec.

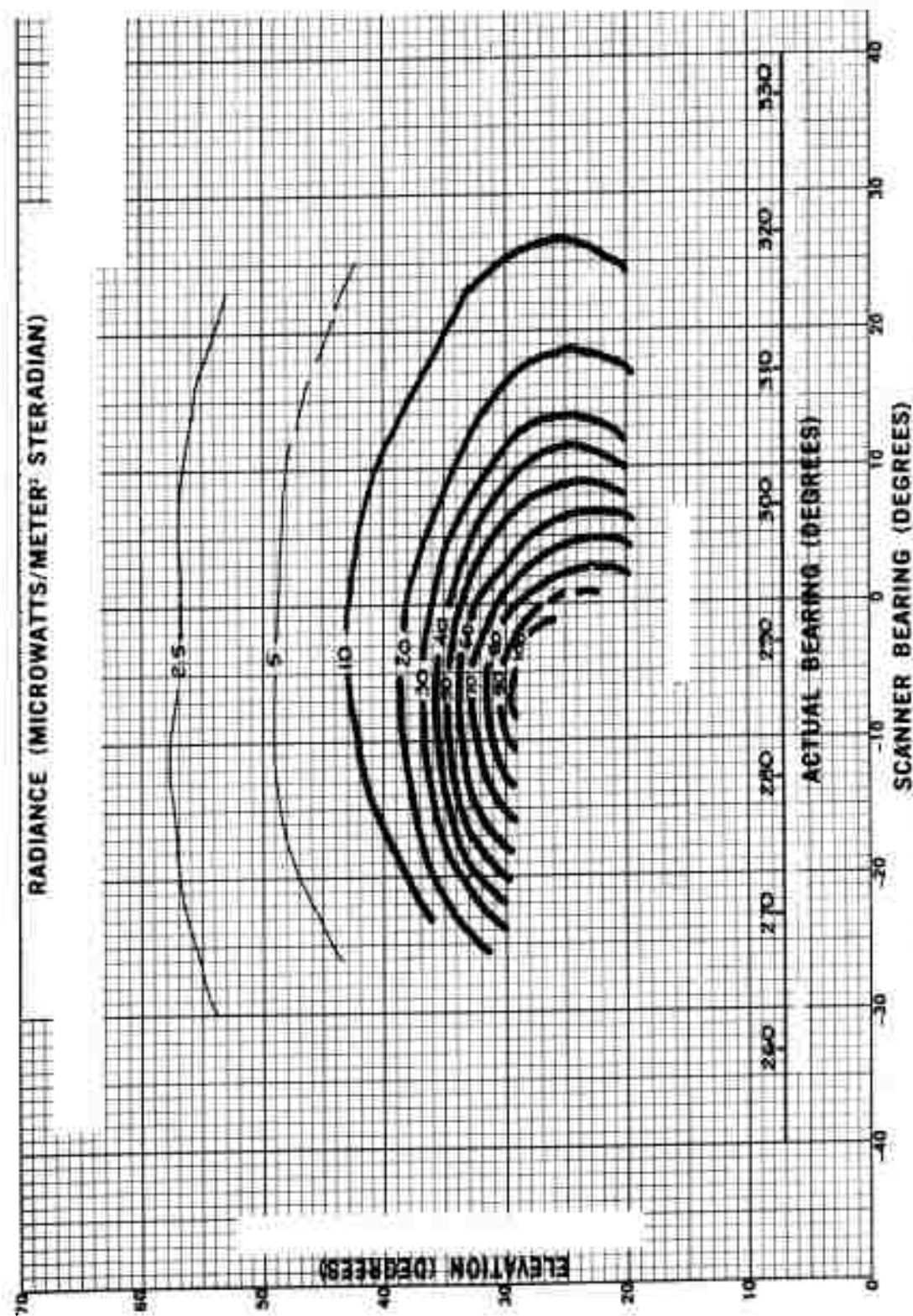


Figure 3.663 Sky radiance, Kettle 1, King Fish, 0.521 to 0.567 micron, H + 1.022 sec.

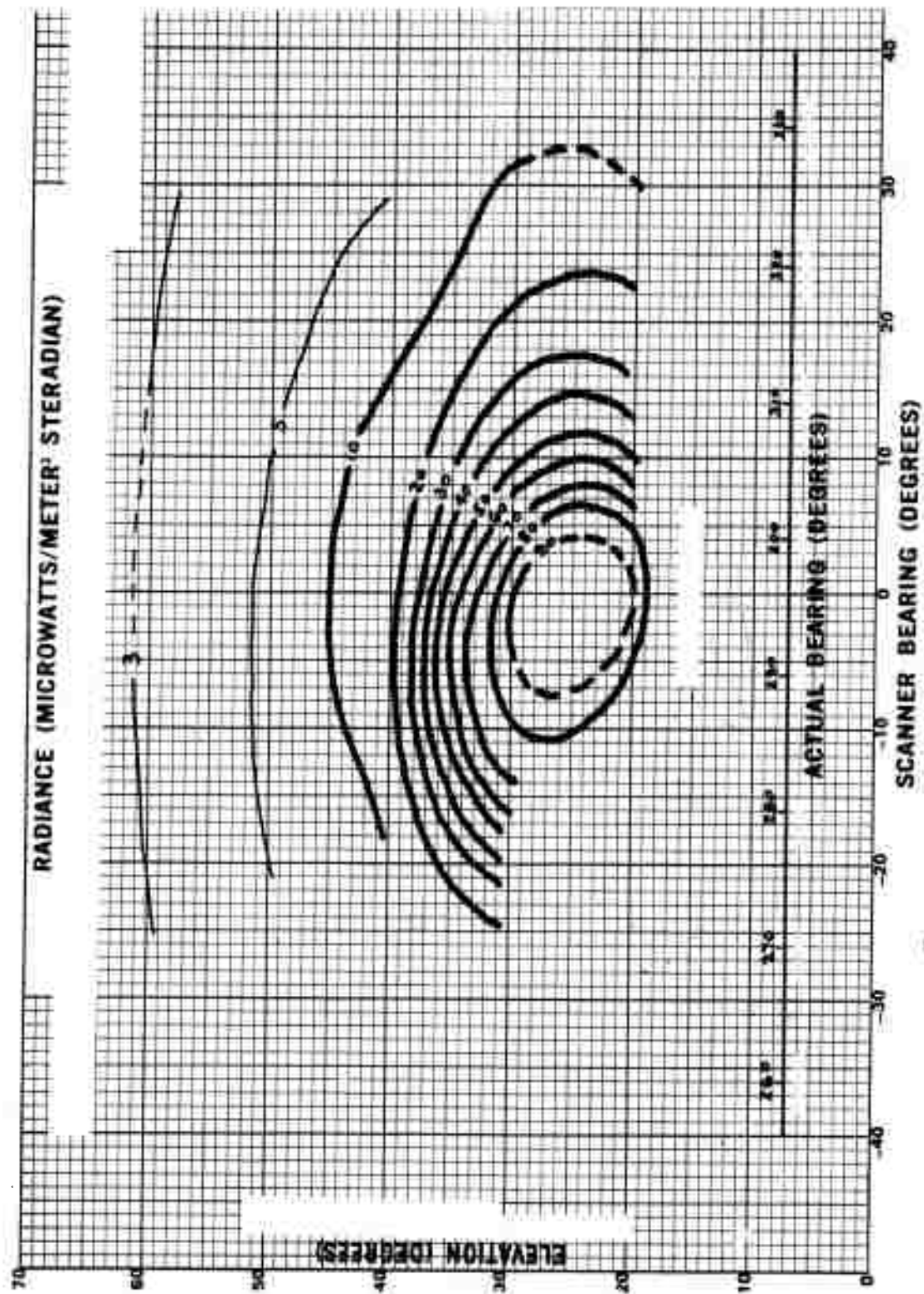


Figure 3-564 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, $H = 1,090$ sec.

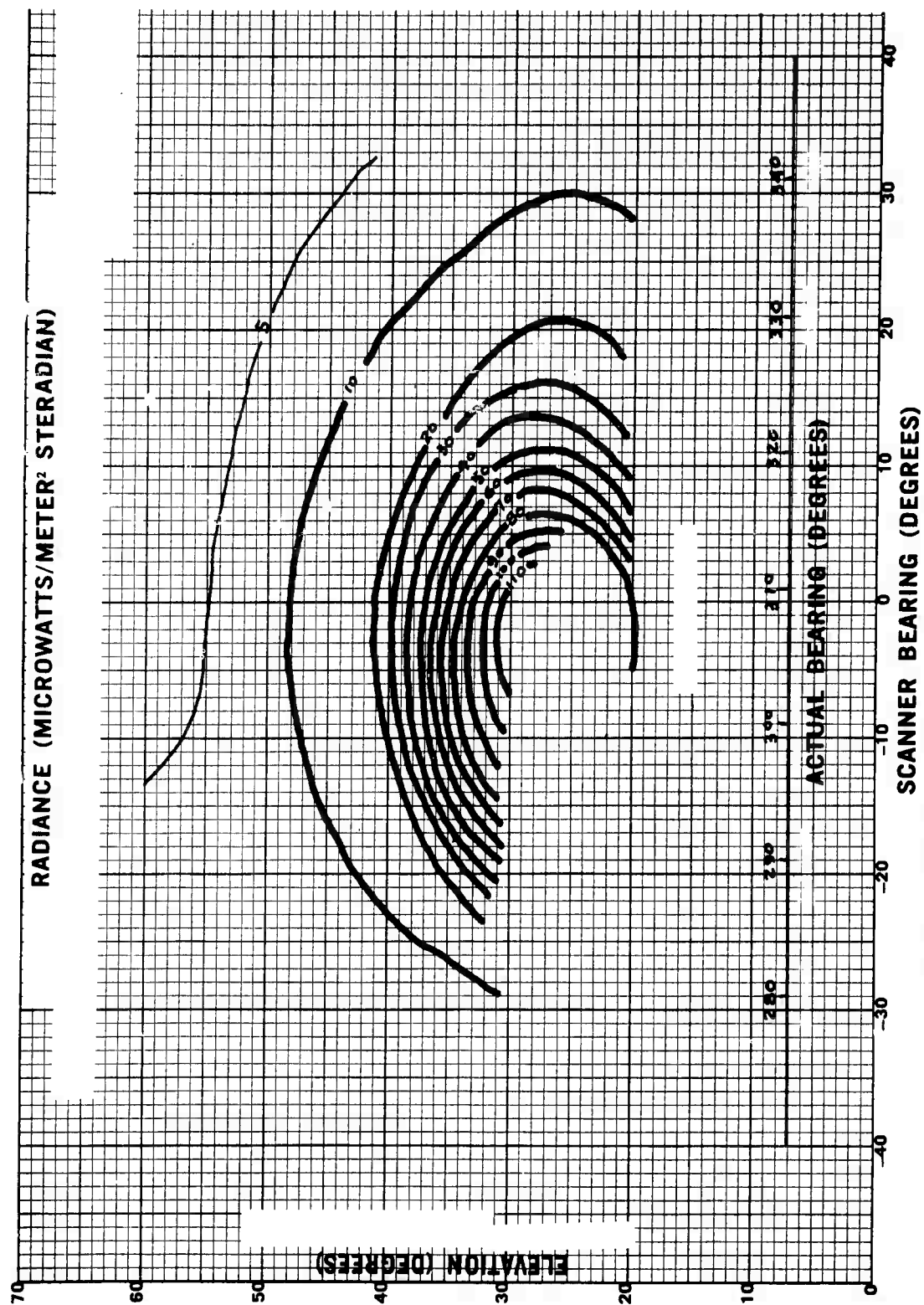


Figure 3.566 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 1,225 sec.

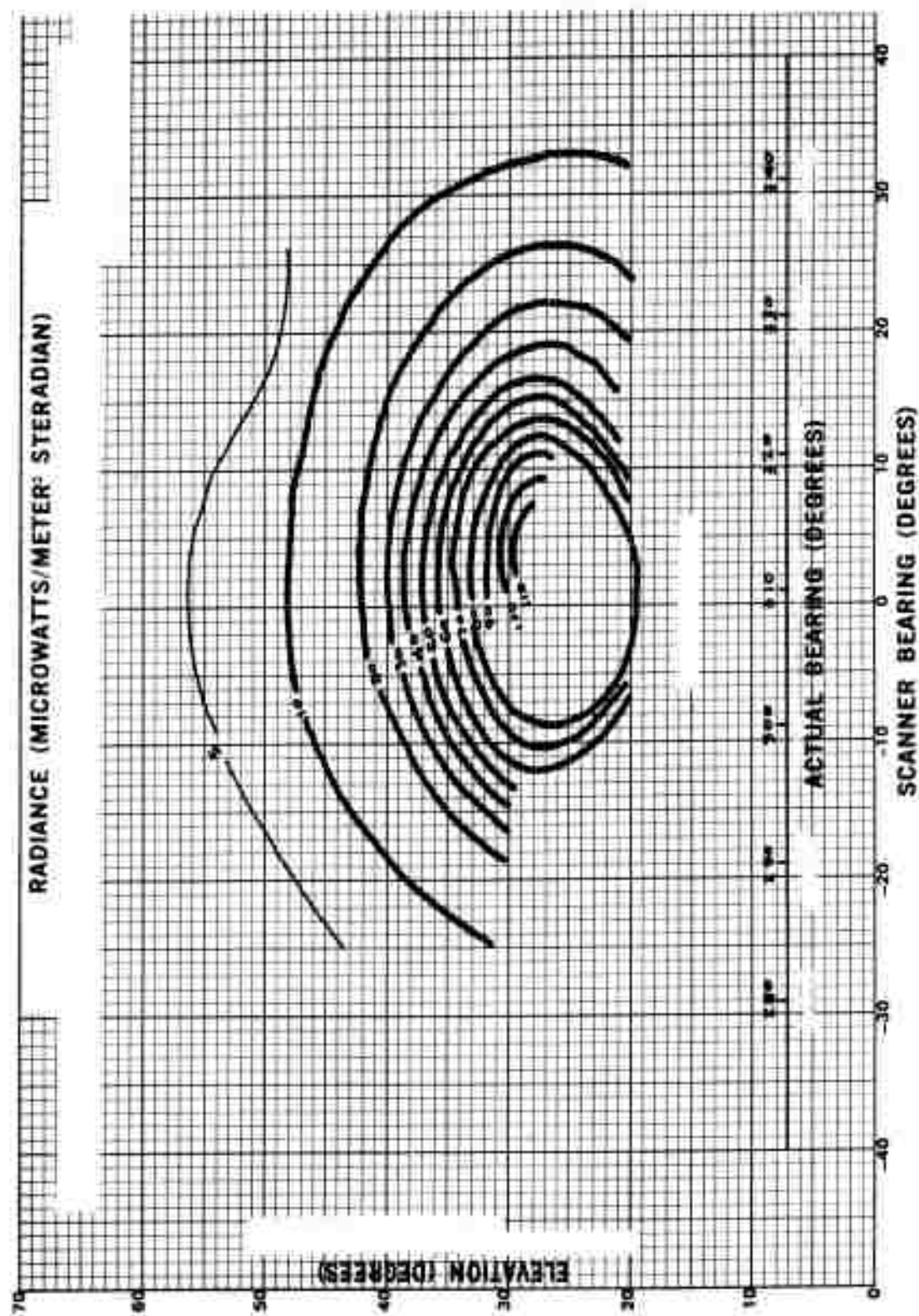


Figure 3.567 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron., H+1,293 sec.

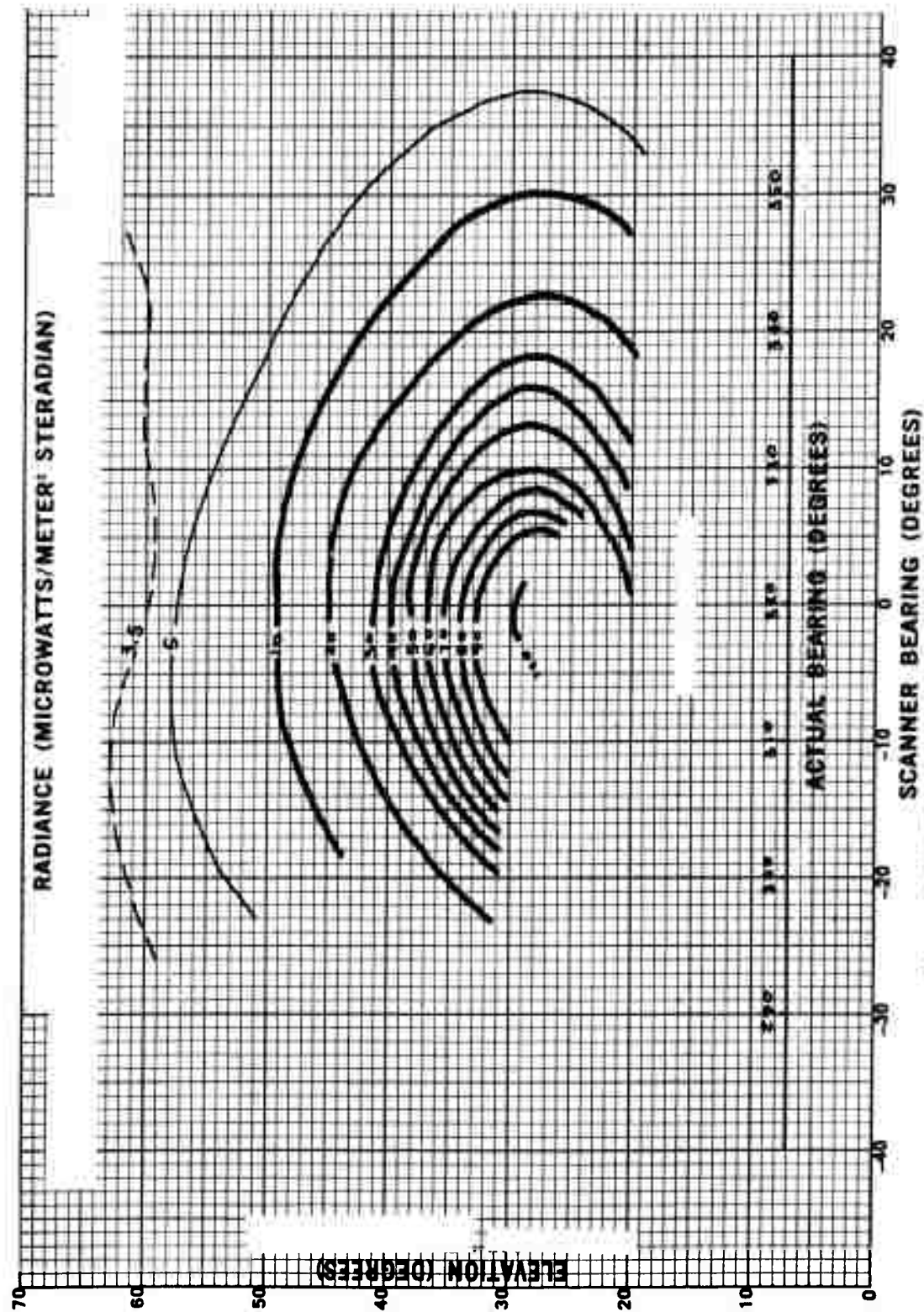


Figure 3.508 Sky radiance, Kettle 1, King Fish, 0.531 to 0.567 microns, $H = 1,361$ sec.

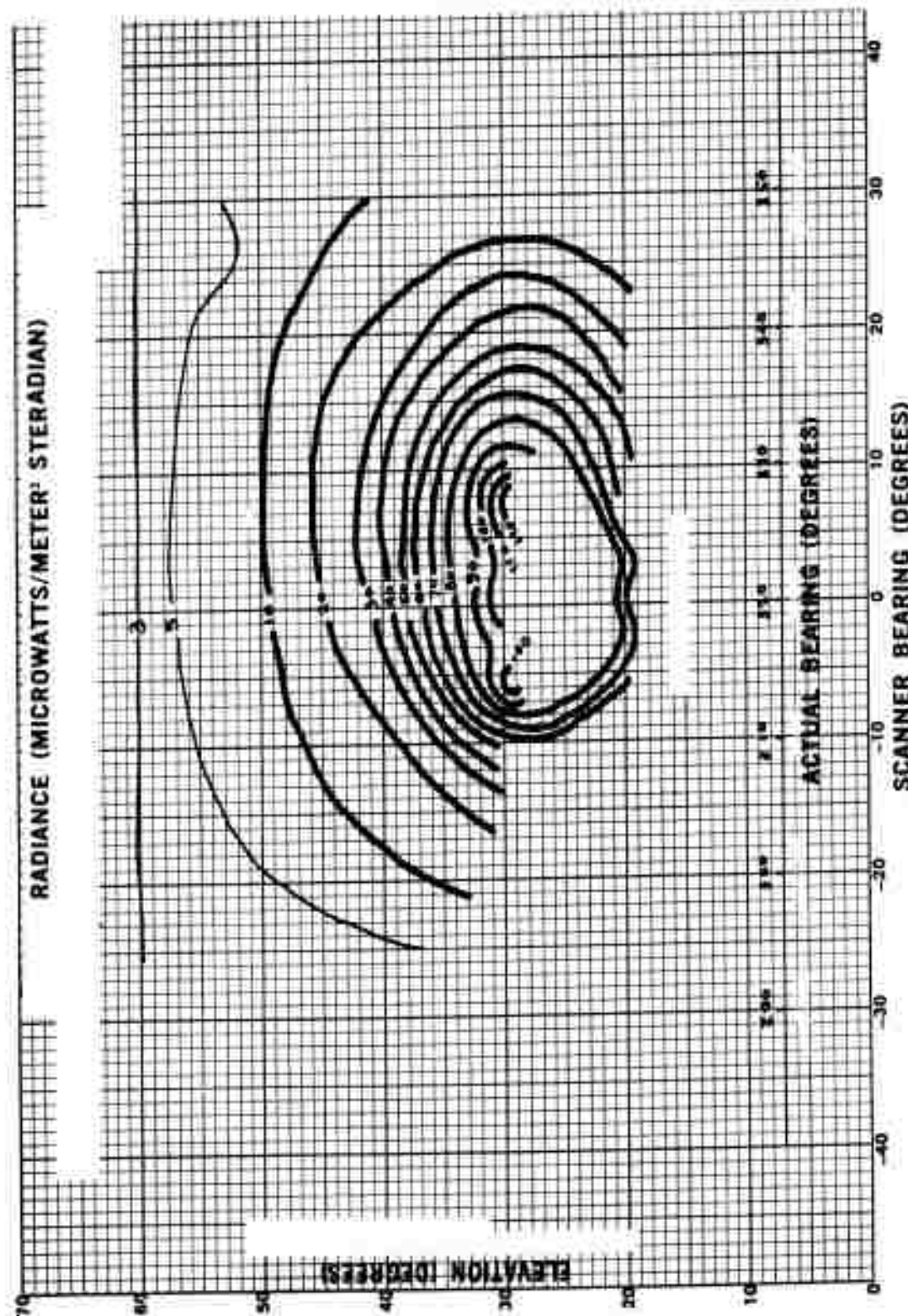


Figure 3.569 Sky radiance, Katie I, King Fish, 0.521 to 0.567 micron, H+1.428 sec.

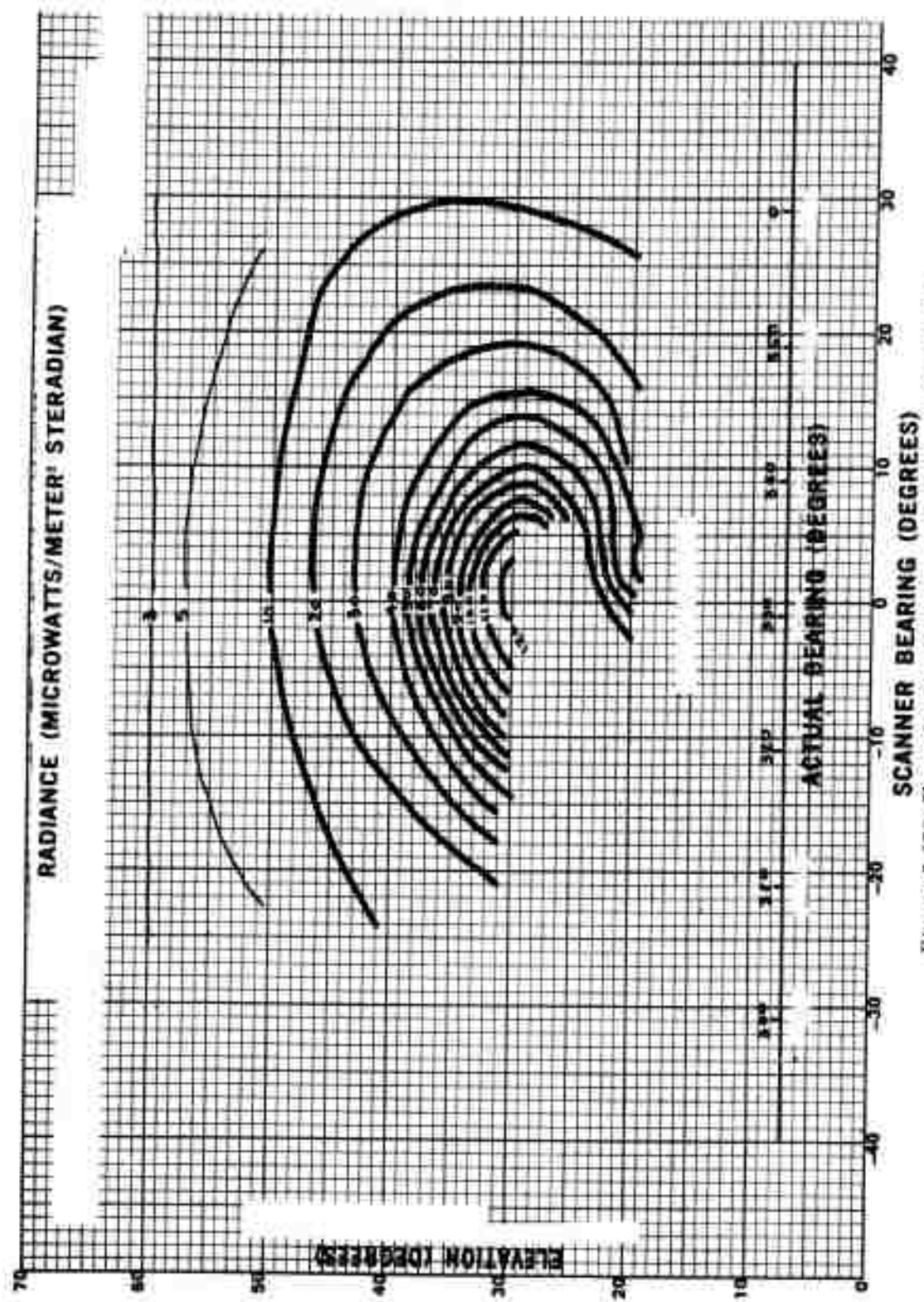


Figure 3.570 Sky radiance, Kottie I, King Fish, 0.521 to 0.567 microm, H + 1,496 sec.

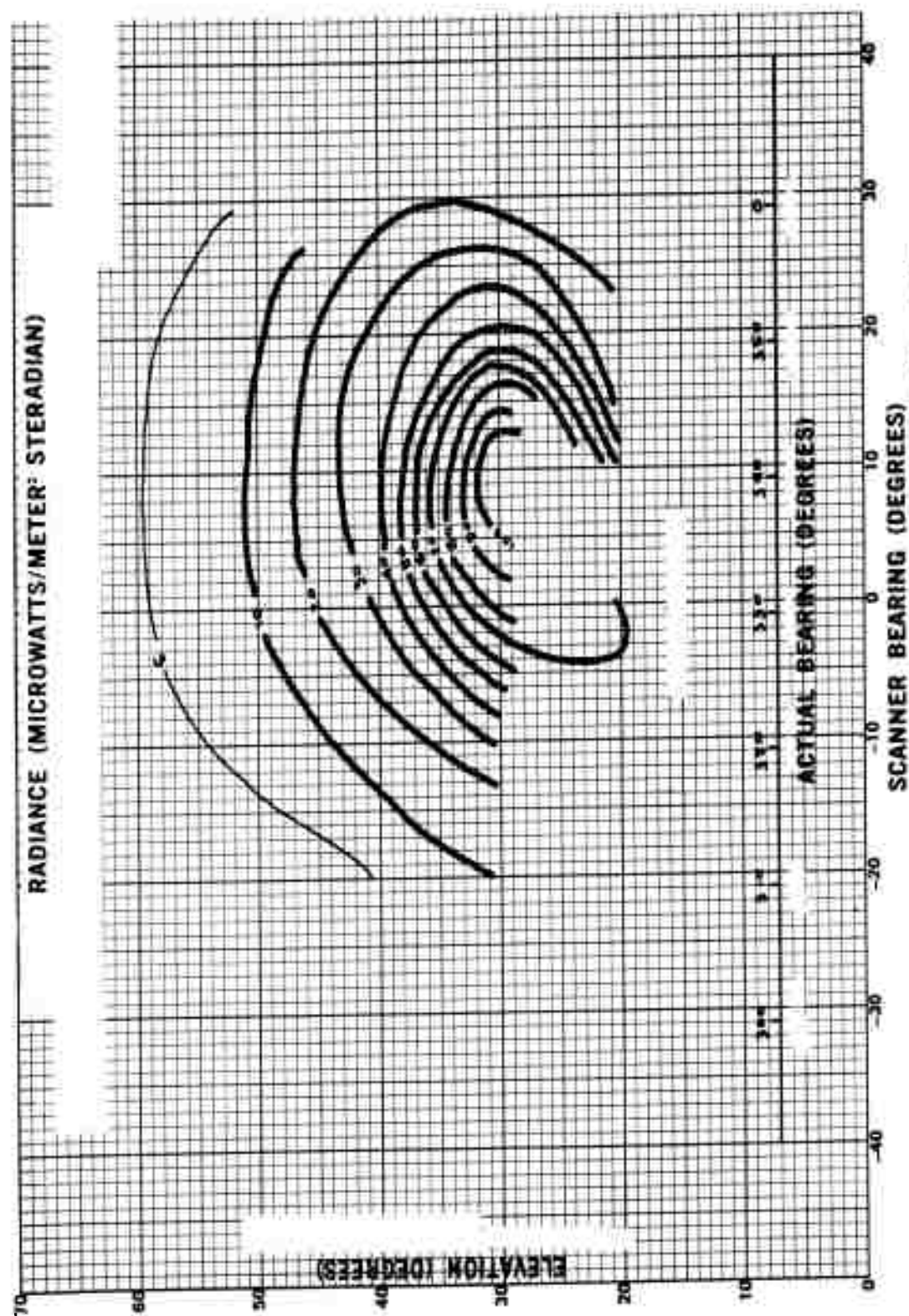


Figure 3.571 Sky radiance, Kettle I, King Fish, 0.571 to 0.587 microm. H+1.564 sec.

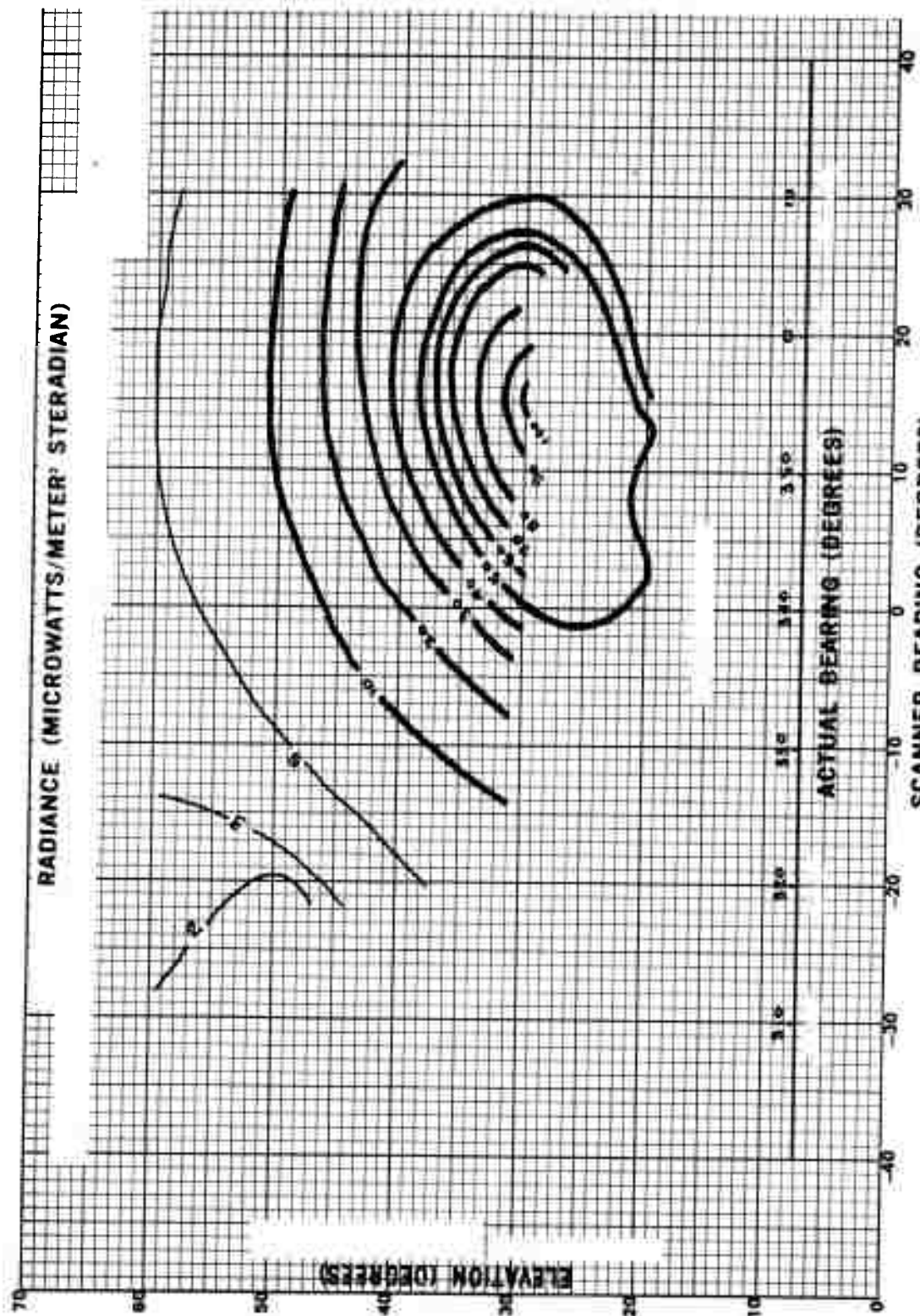


Figure 3.572 Sky radiance, Kettle 1, King Fish, 0.521 to 0.567 micron, H + 1,700 sec.

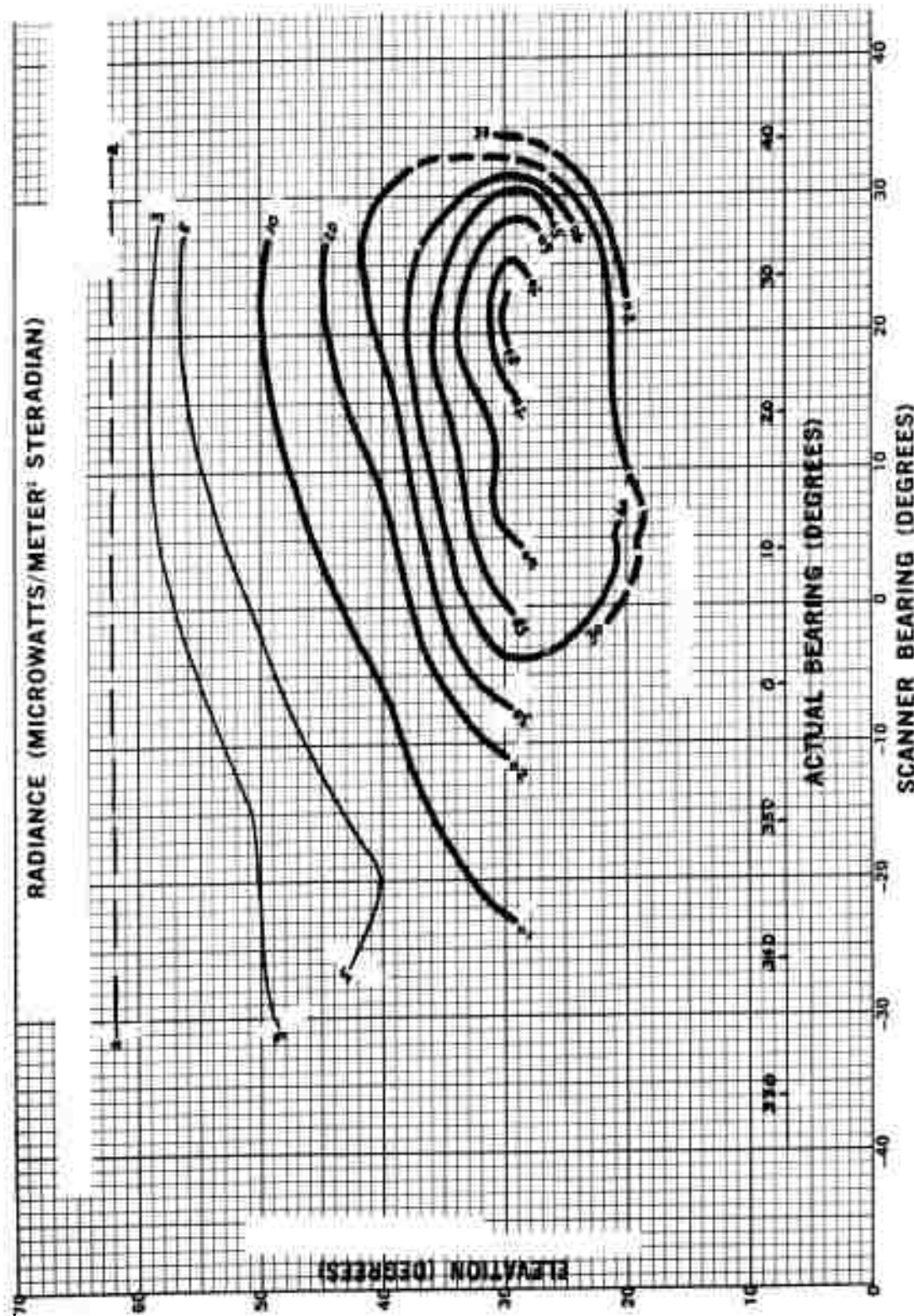


Figure B.573 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 microns. H+1.971 sec.

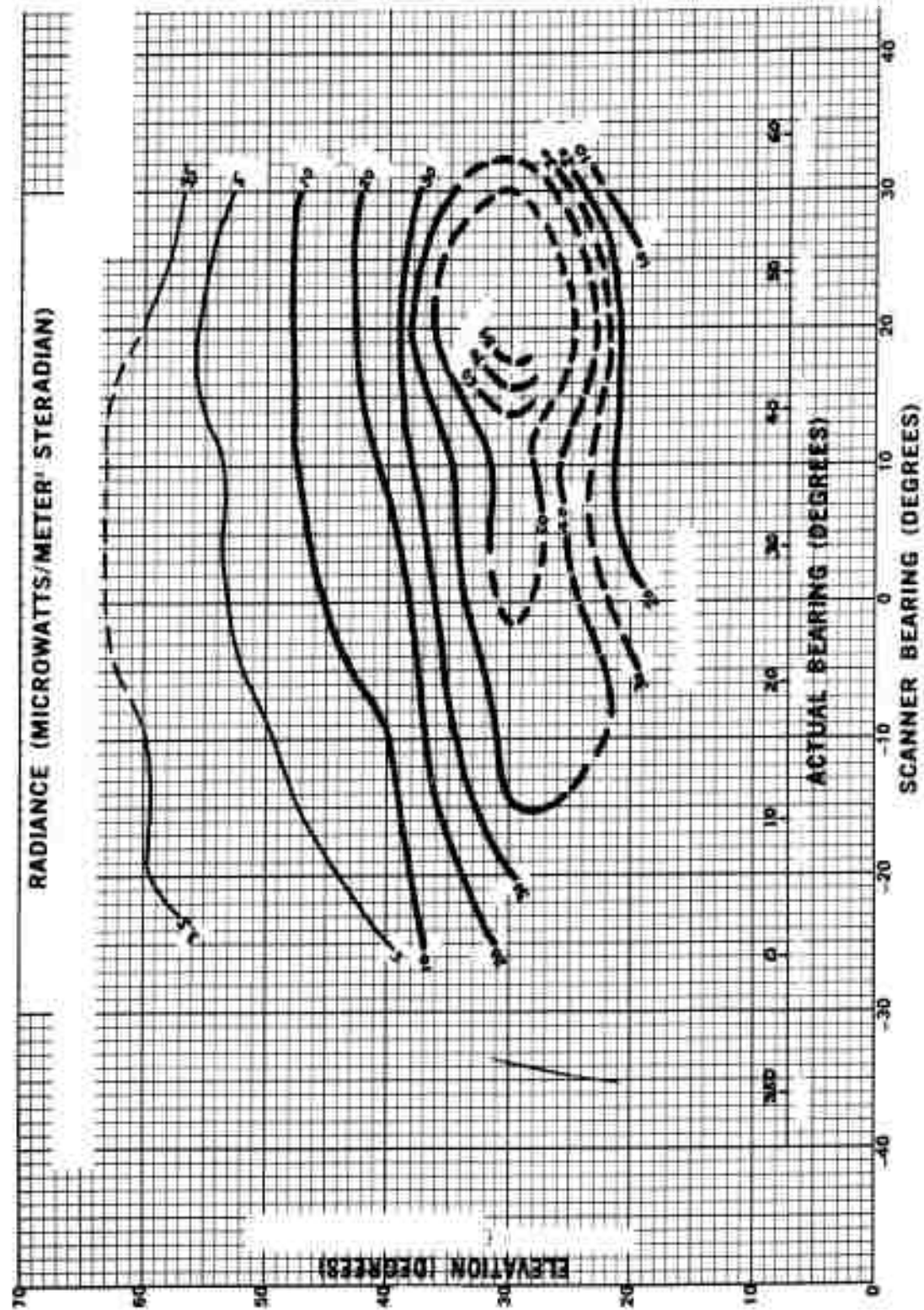


Figure 3.574 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 2.106 sec.

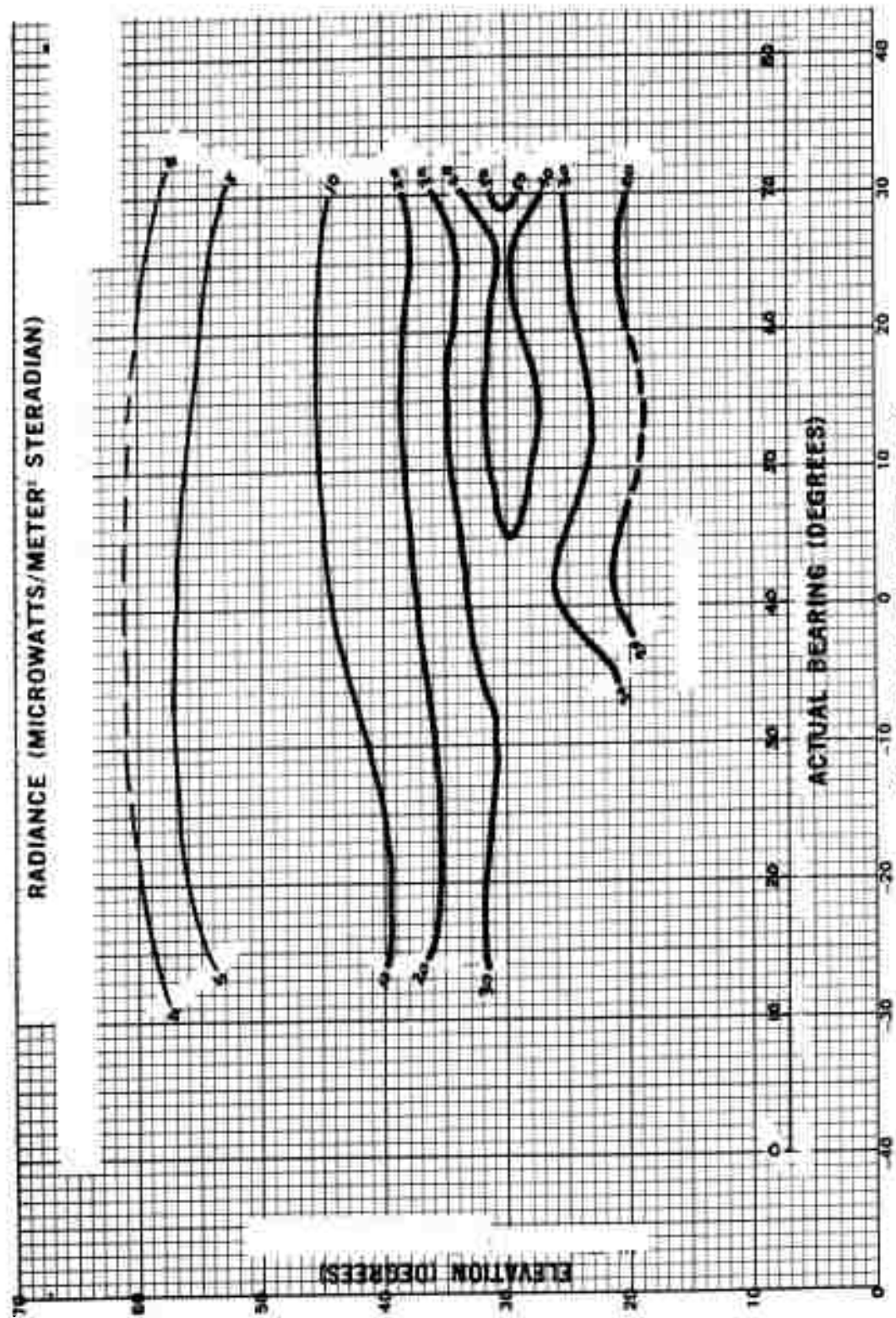


Figure 3.575 Sky radiance, Kettle 1, King Fish, 0.521 to 0.587 micron, H + 2,300 sec.

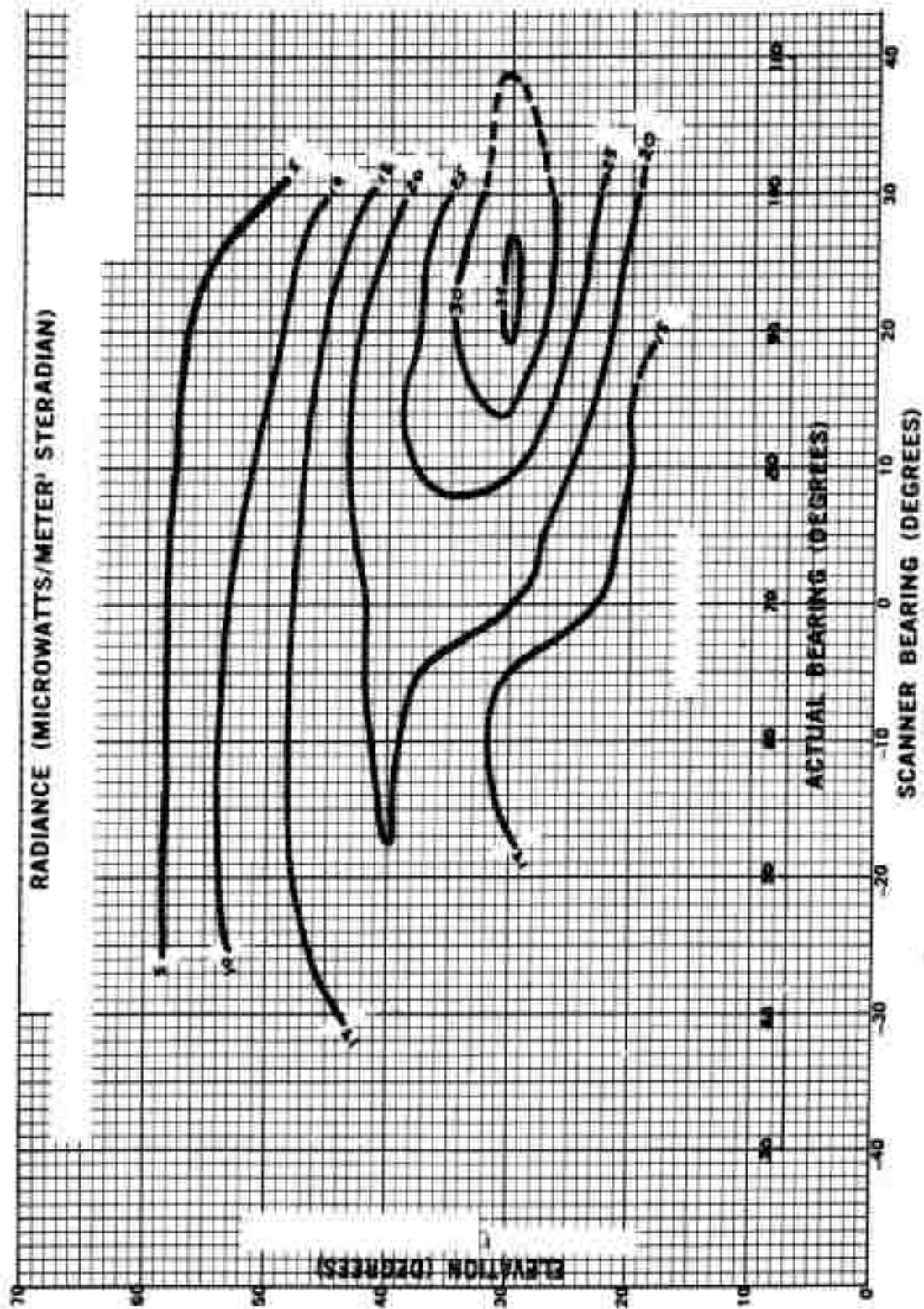


Figure 3.576 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 microns, H + 2,581 sec.

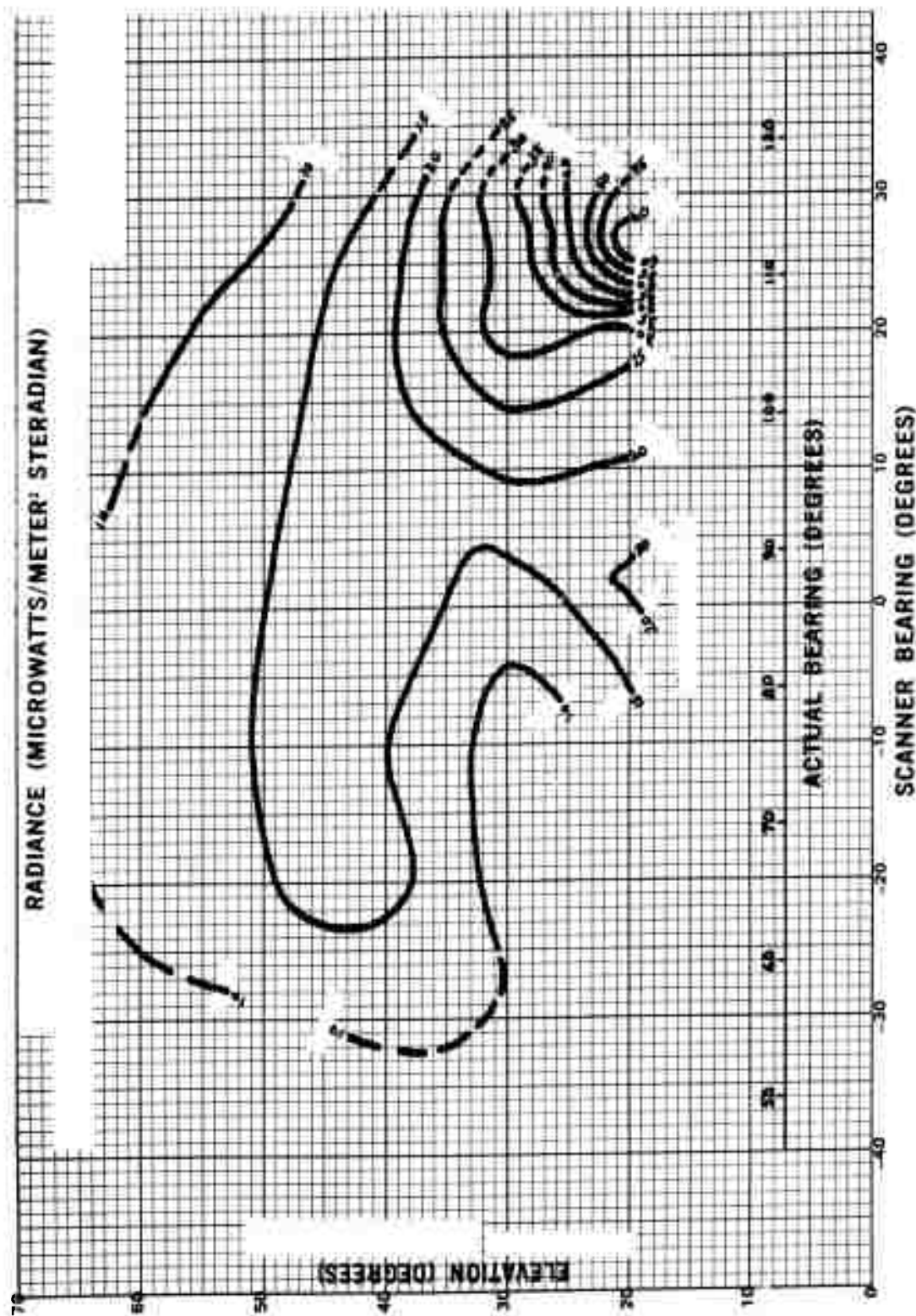


Figure 3.577 Sky radiance. Kottie I, King Fish, 0.521 to 0.567 micron, H + 2.784 sec.

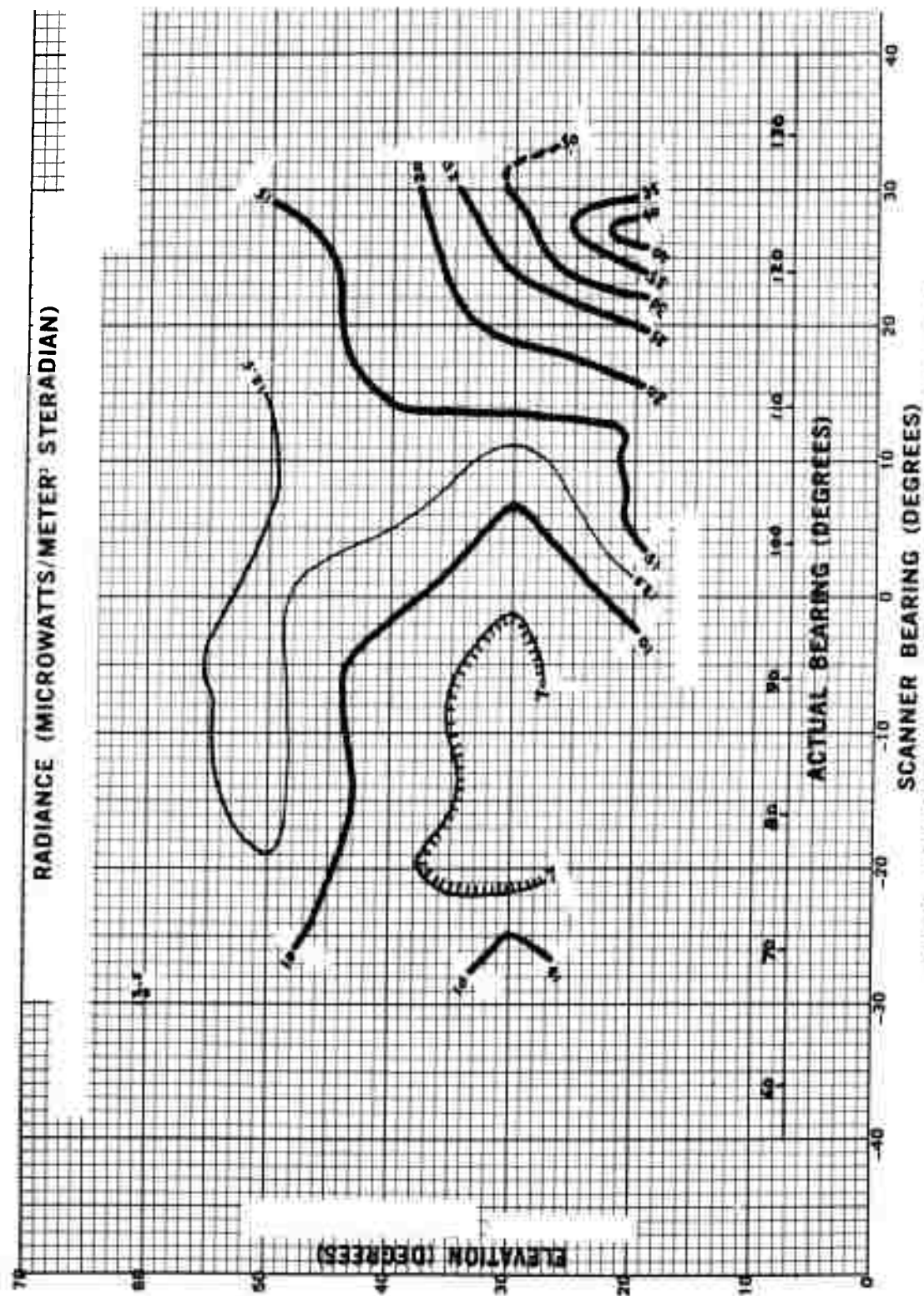


Figure 3.578 Sky Radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 3.020 sec.

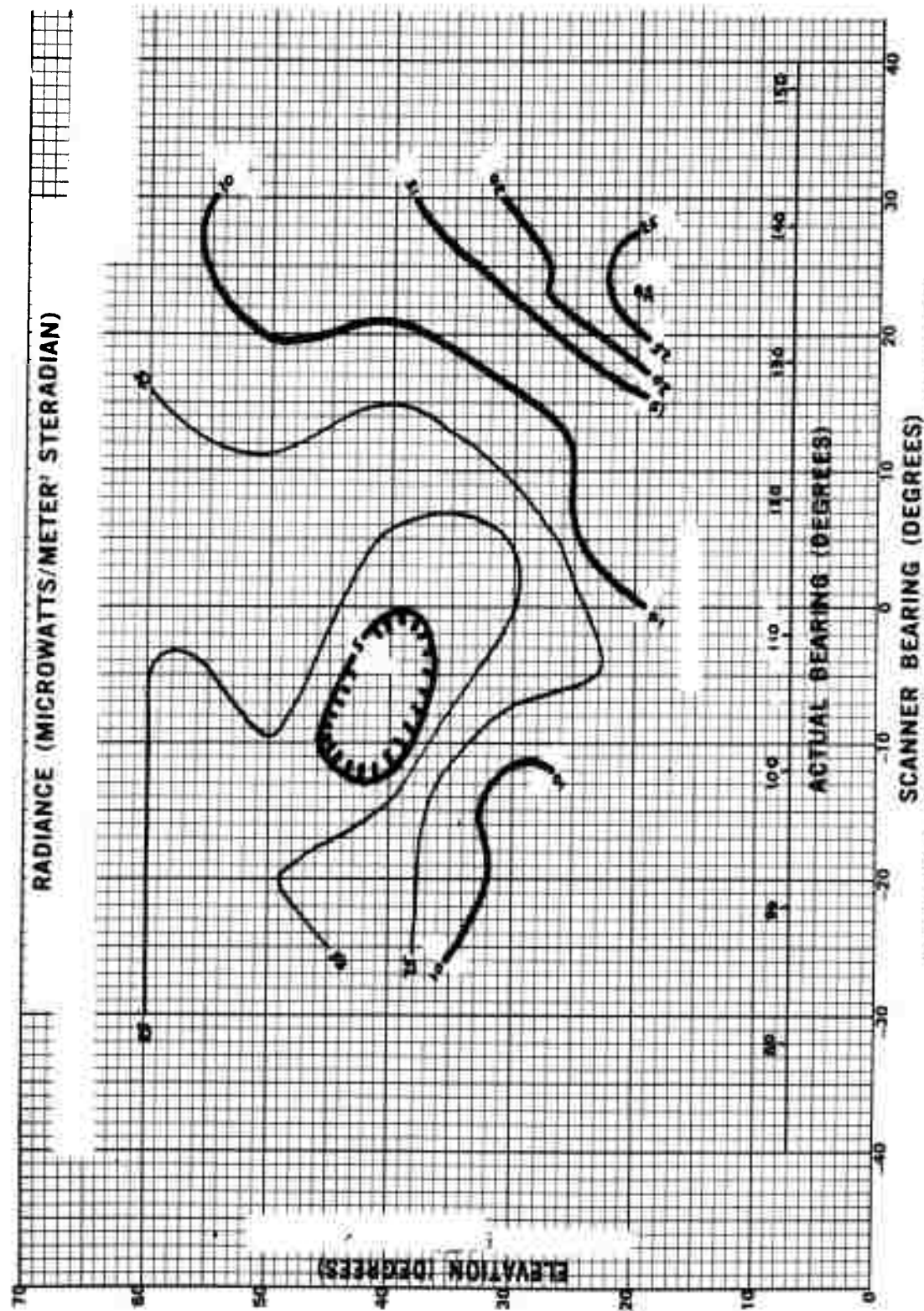


Figure 3.579 Sky radiance, Kettle I, King Fish, 0.521 to 0.567 micron, H + 3.123 sec.

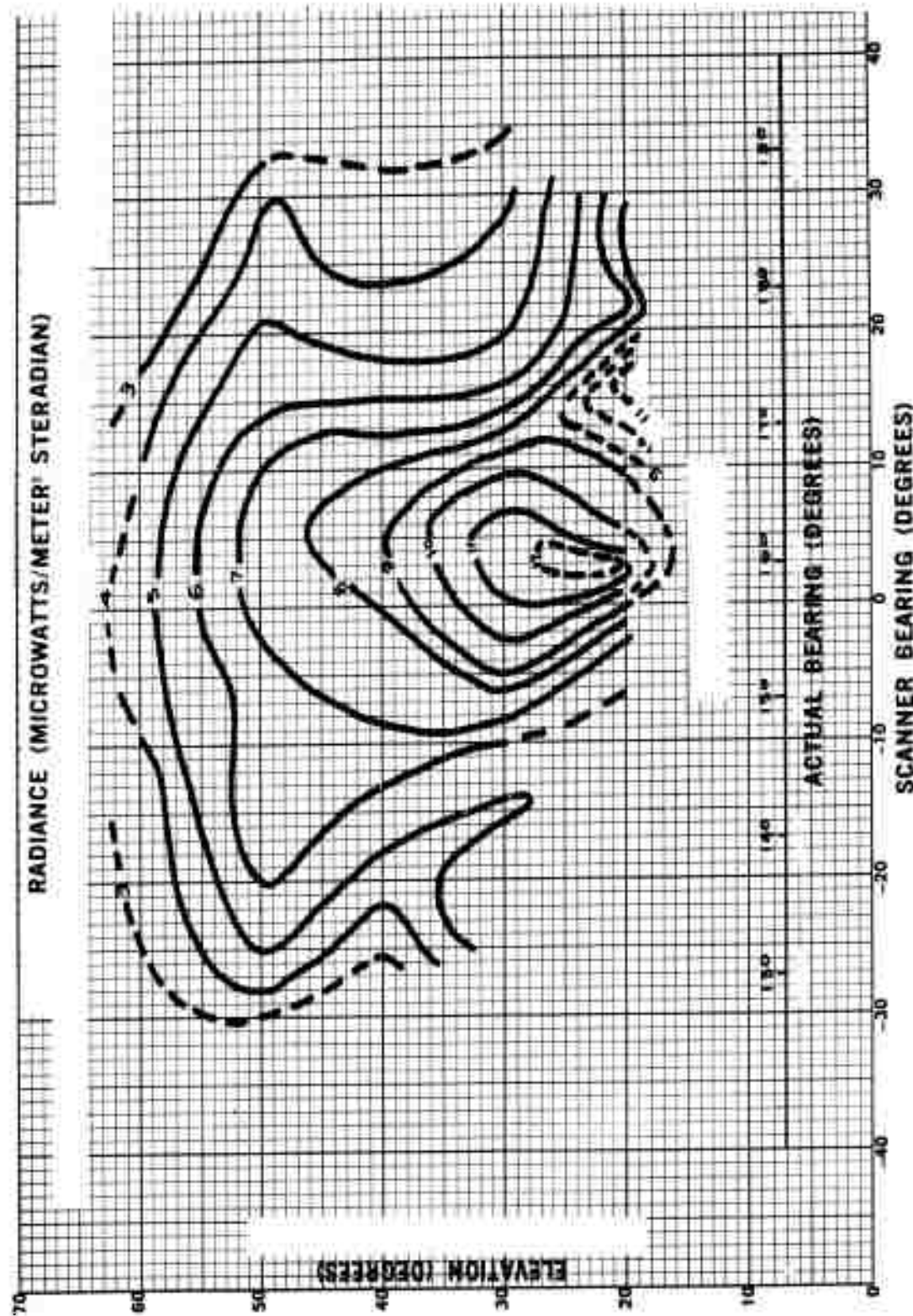


Figure 3.581 Sky radiance, Kettle I, King Fish, 0.531 to 0.567 micron, H + 3.668 sec.

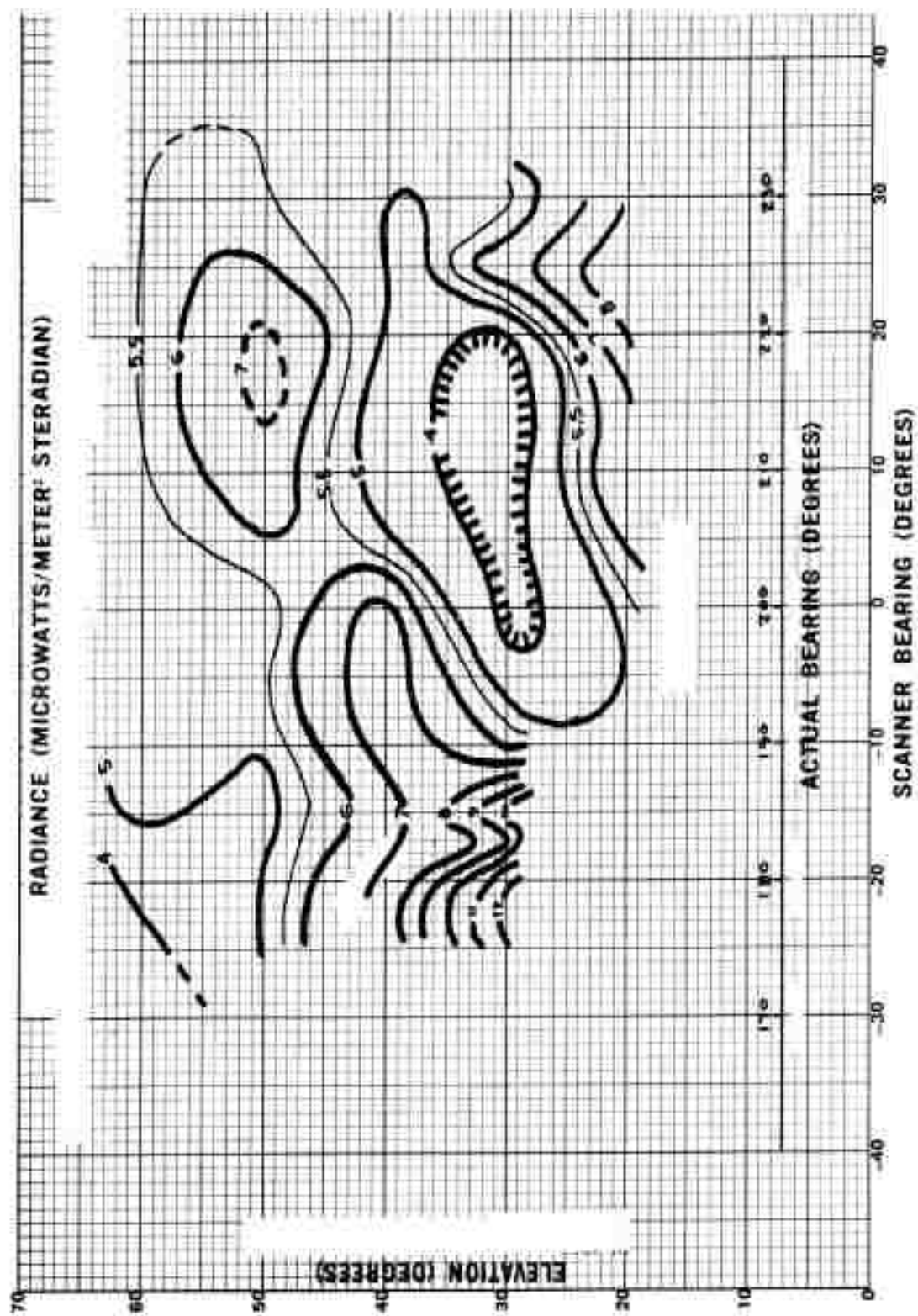


Figure 3.552 Sky radiance, Kettle 1, King Fish, 0.521 to 0.567 micron, $H = 2,937$ sec.

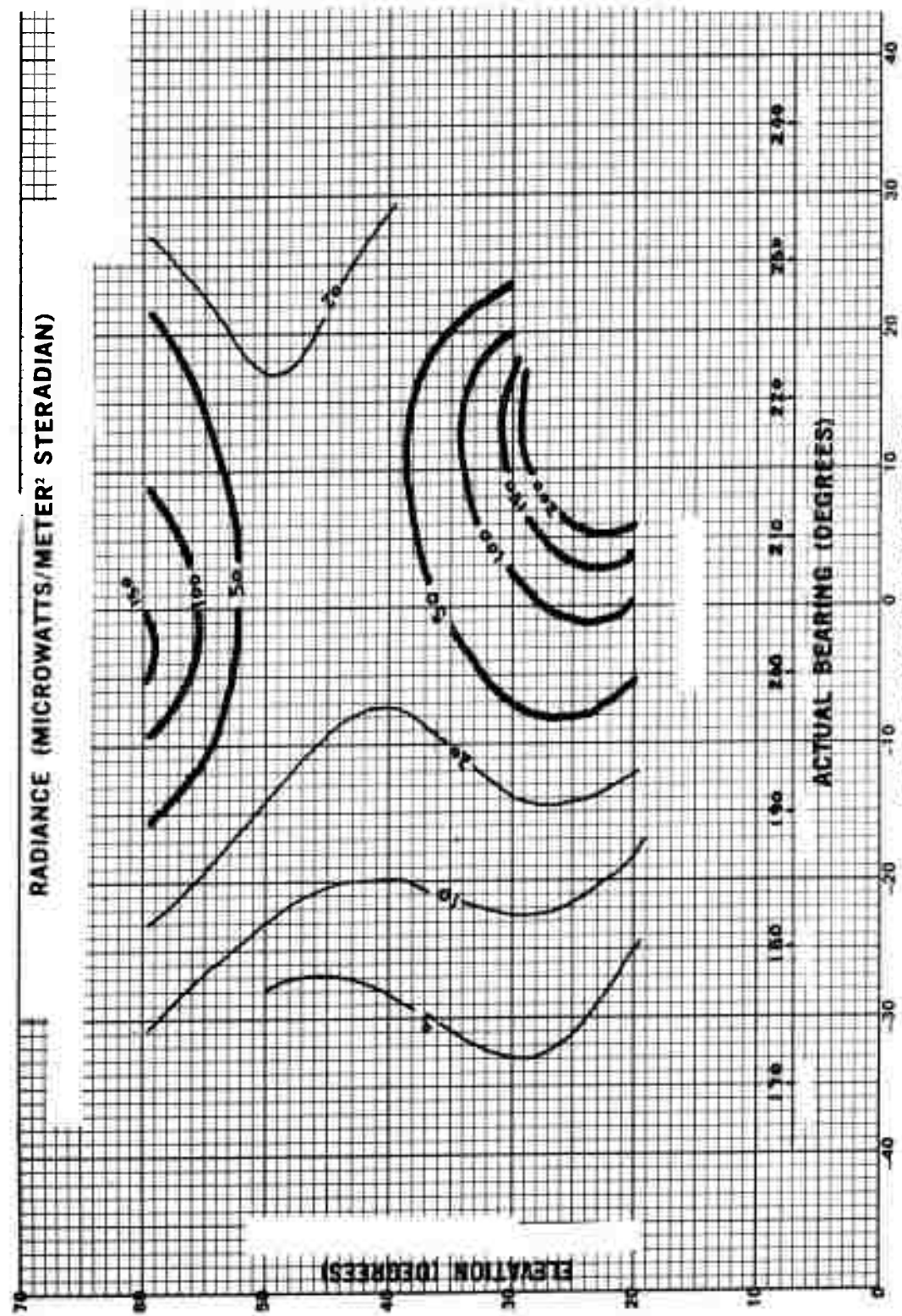


Figure 3.583 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H+15-4 sec.

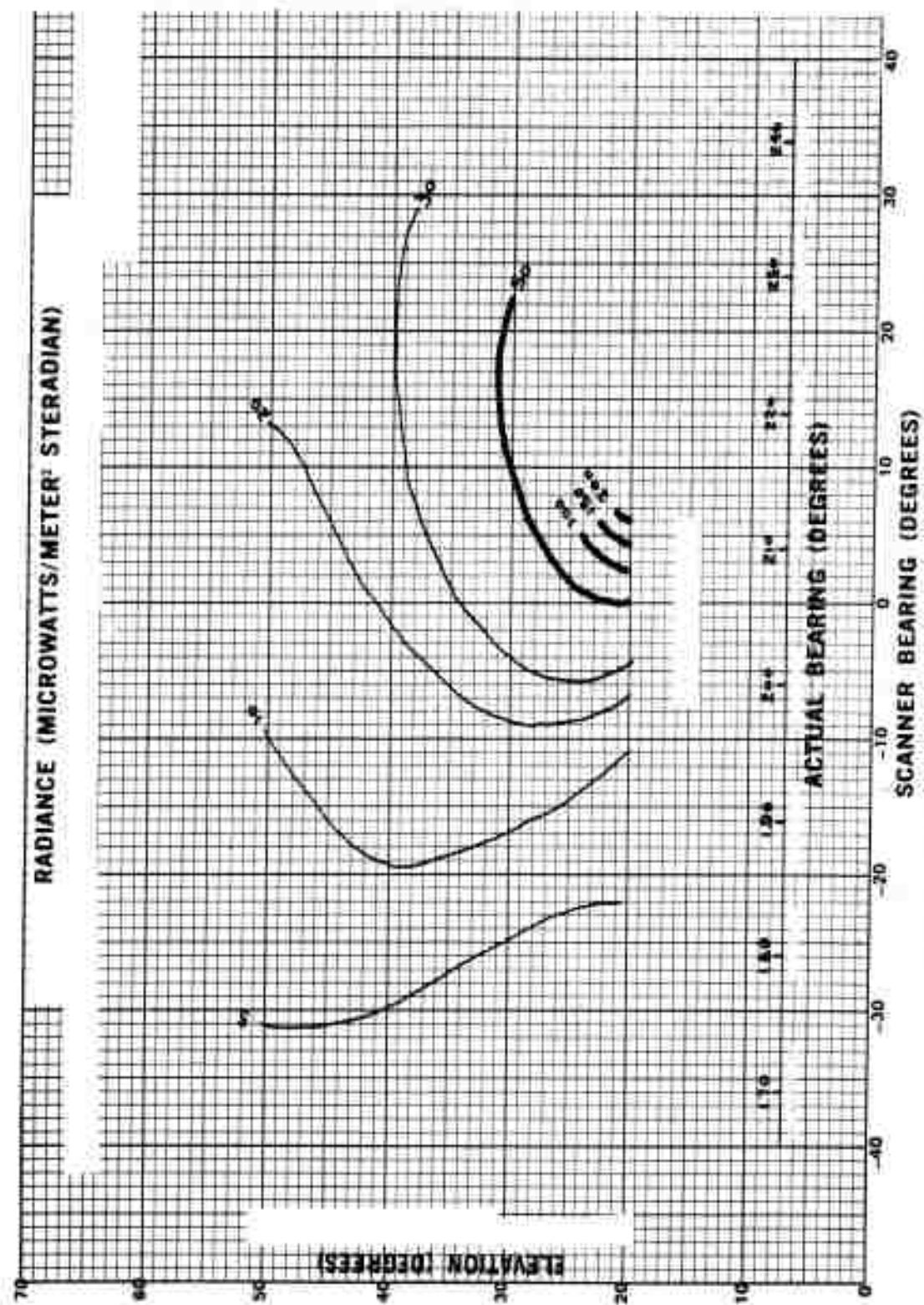


Figure 3.584 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron. H + 221 sec.

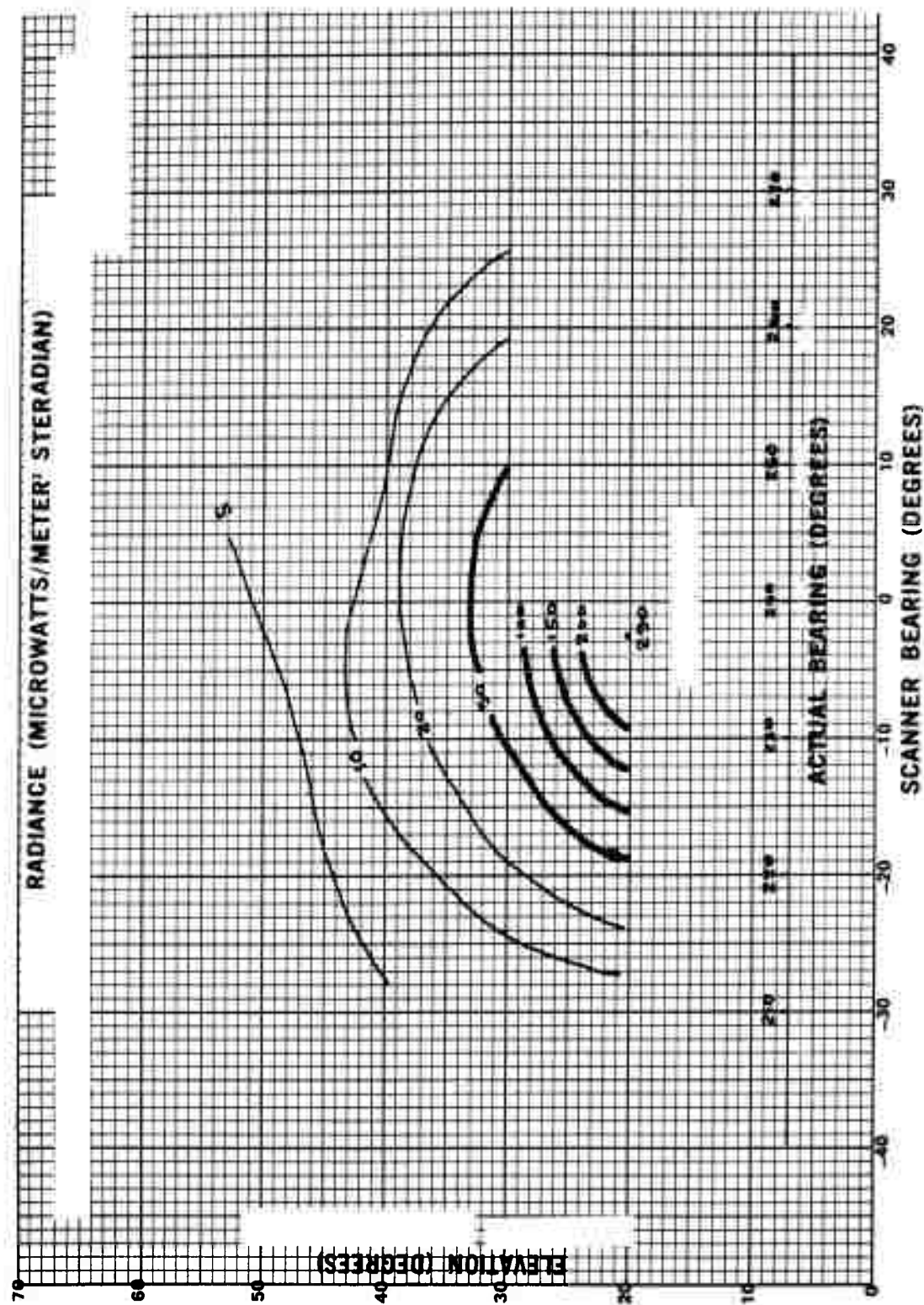


Figure 3.585 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H+424 sec.

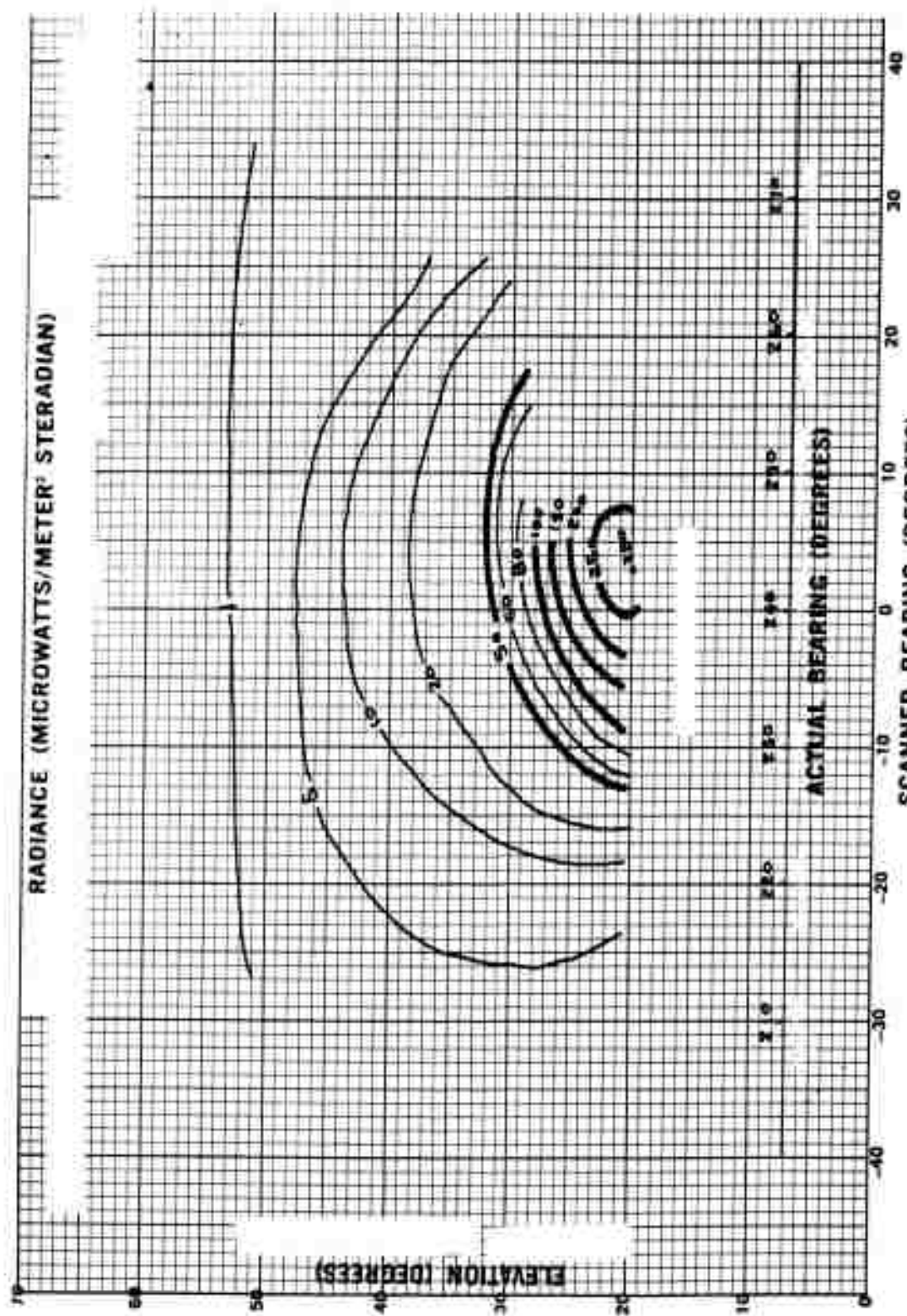


Figure 3.586 Sky radiance, Kettin 1, King Fish, 0.590 to 0.613 micron, H + 492 sec.

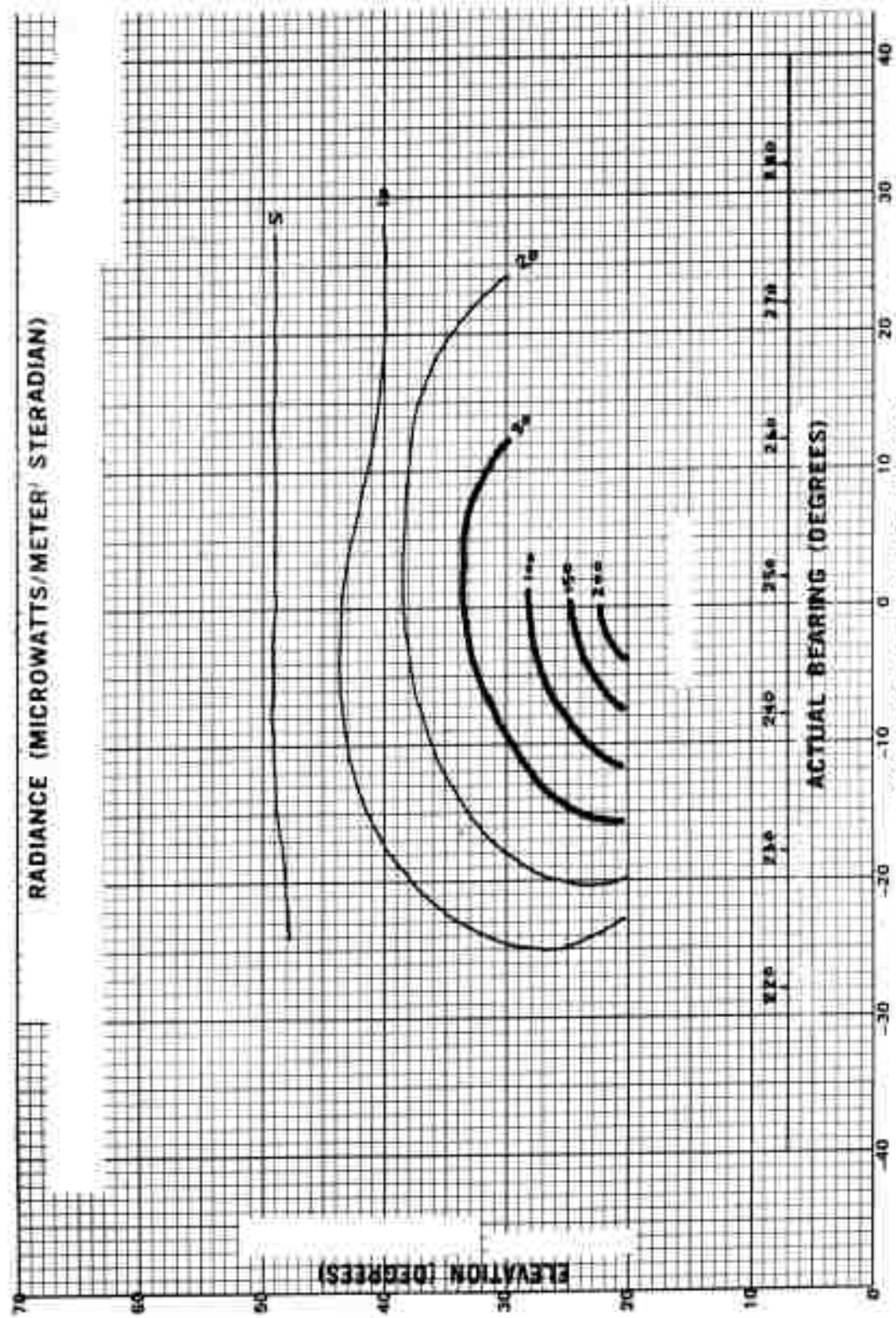


Figure 3.687: Sky radiance, Kettle 1, King Fish, 0.500 to 0.613 micron, H + 160 sec.

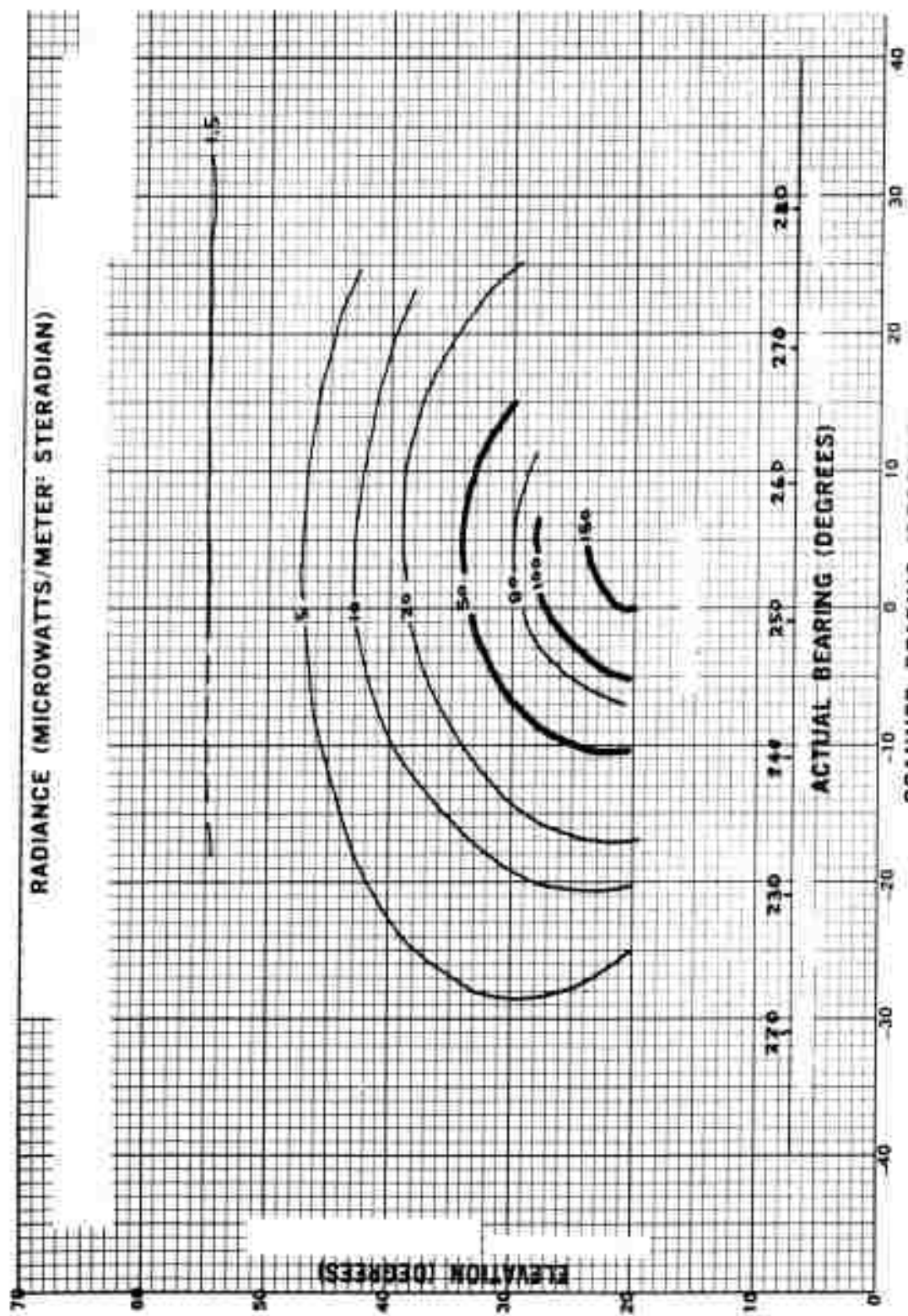


Figure 3.588 Sky radiance, Kettle I, King Fish, 0.613 micron, H + 027 sec.

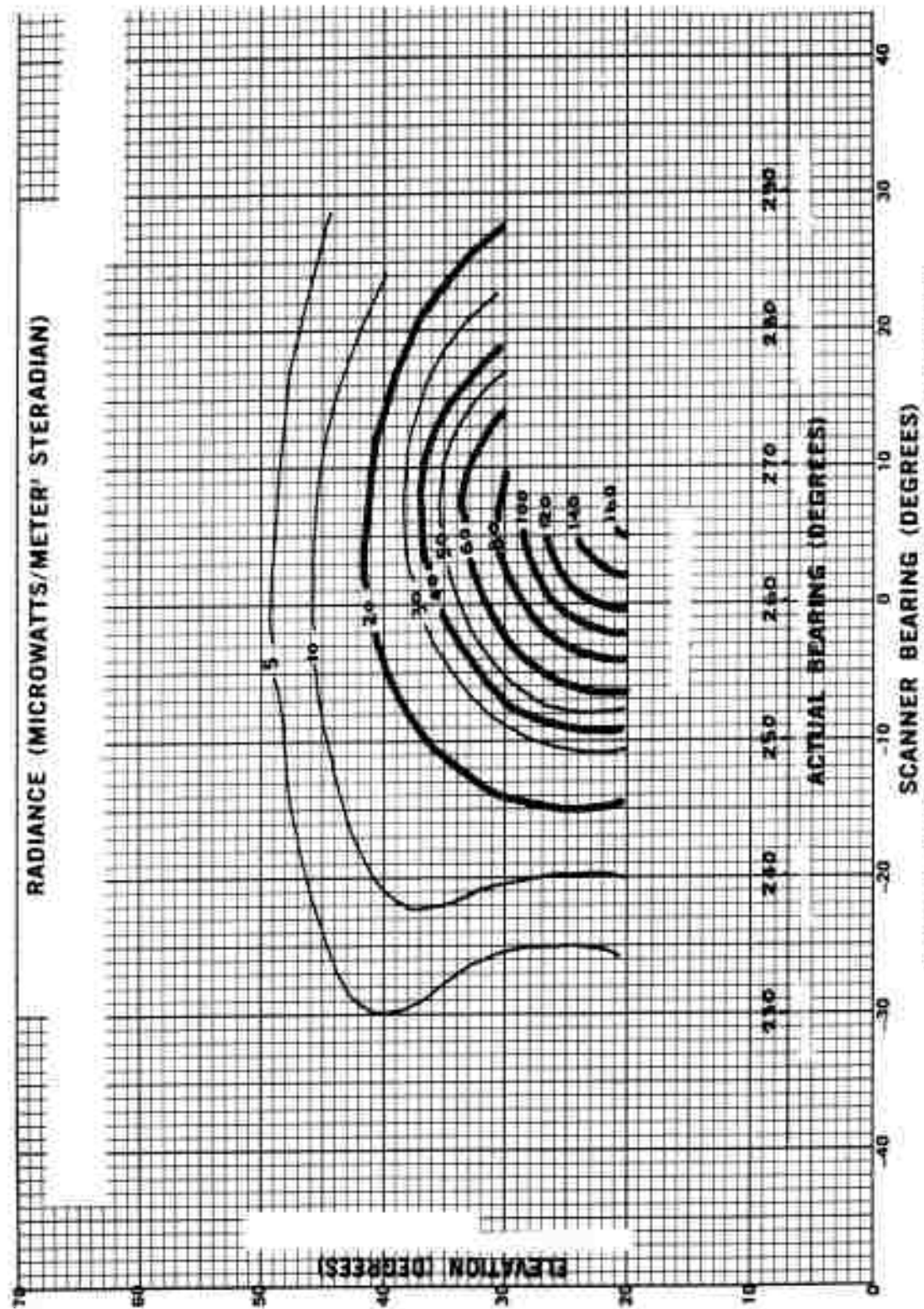


Figure 3.569 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 763 sec.

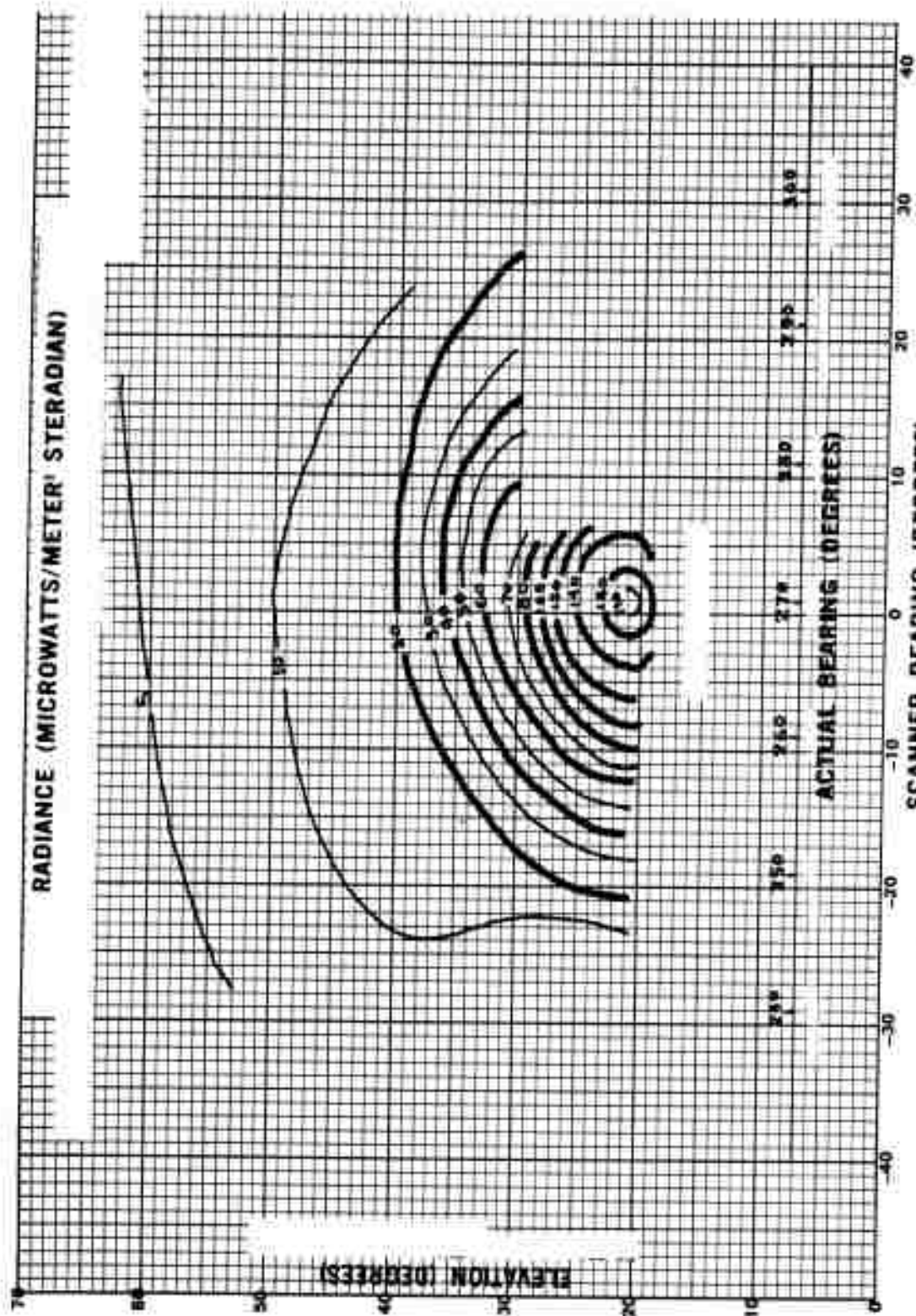


Figure 3.580 Sky radiance, Kettle I, King Fish, 0.580 to 0.613 microns, H + 830 sec.

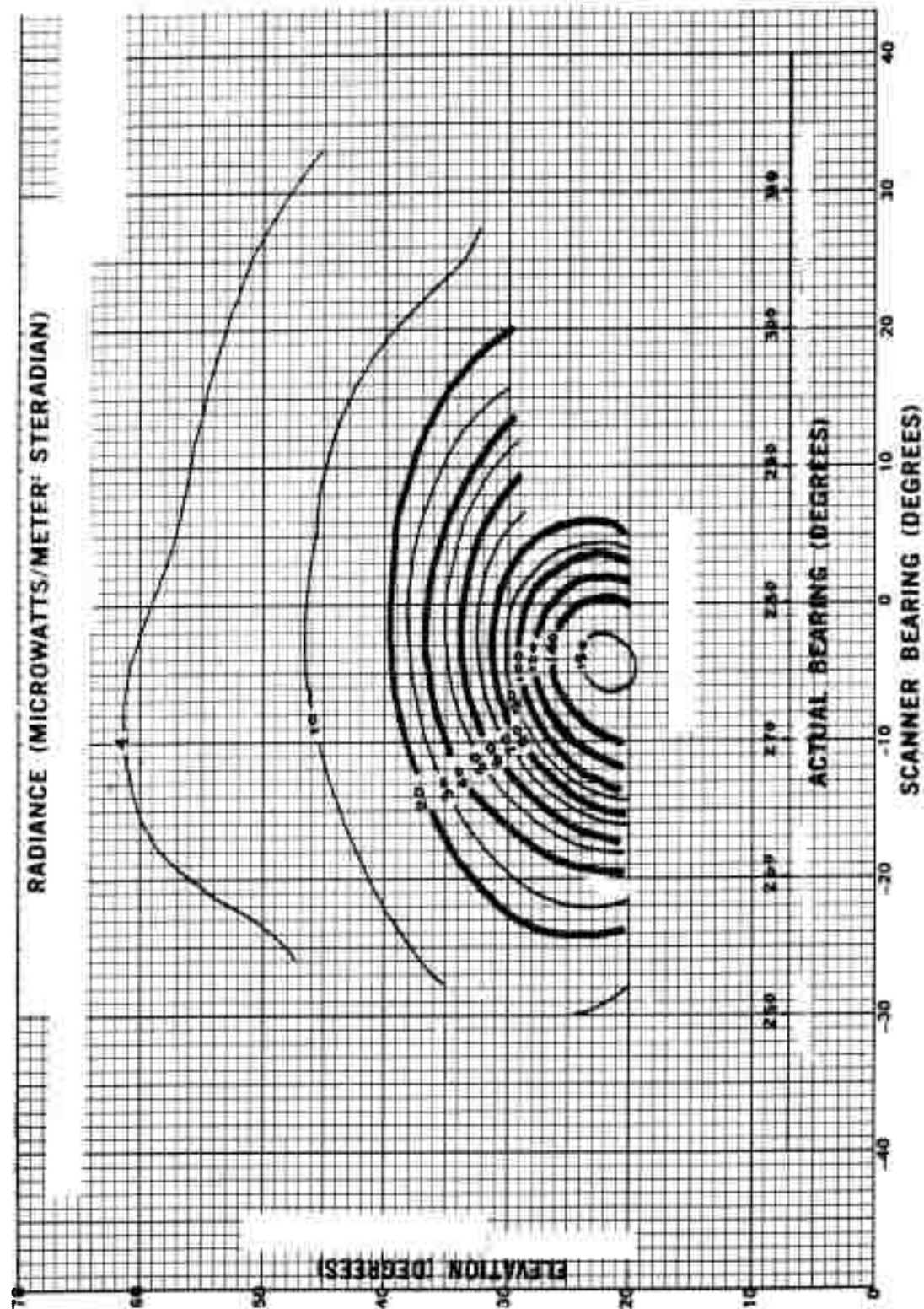


Figure 3.591 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 898 sec.

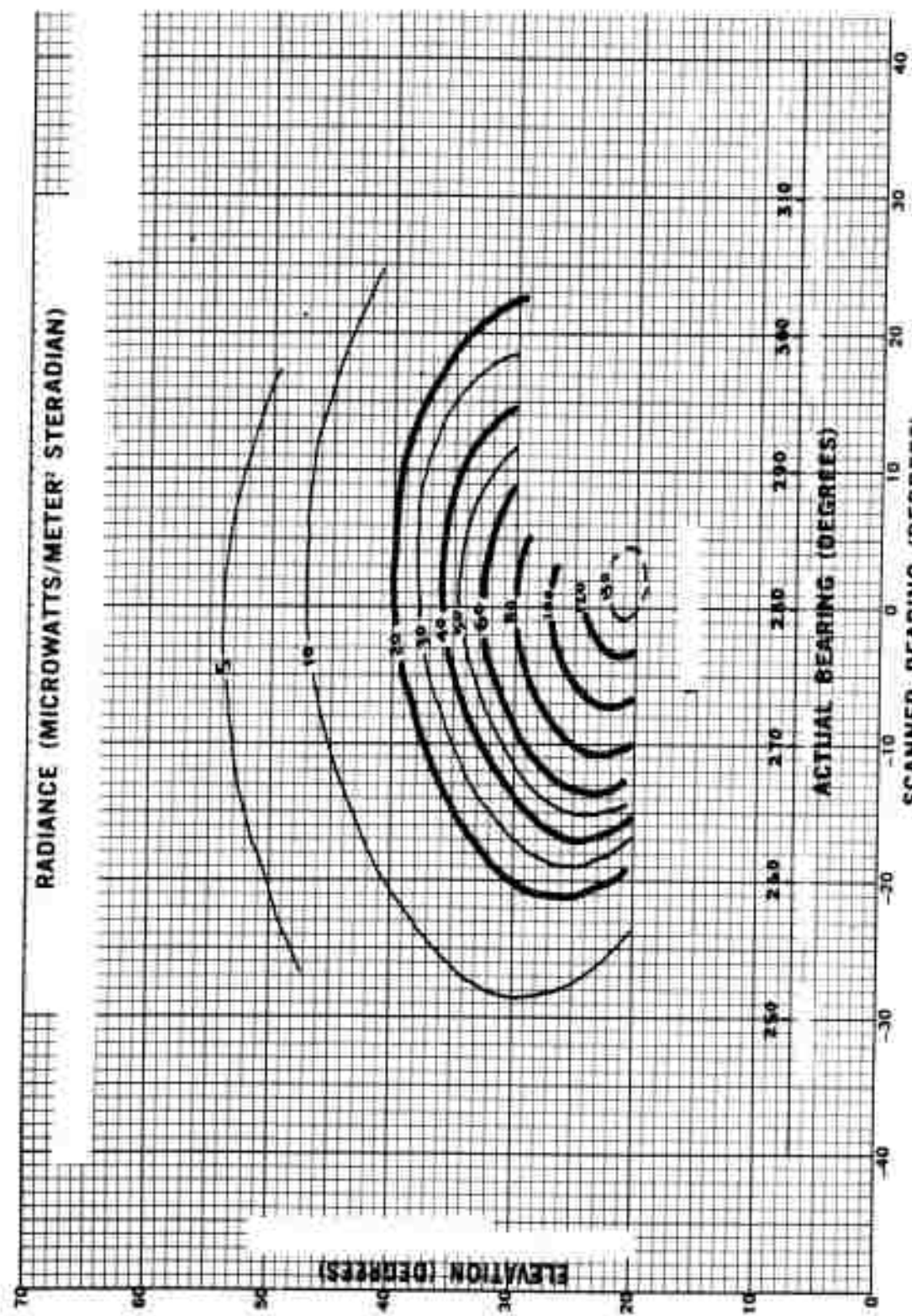


Figure 3.592 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 065 sec.

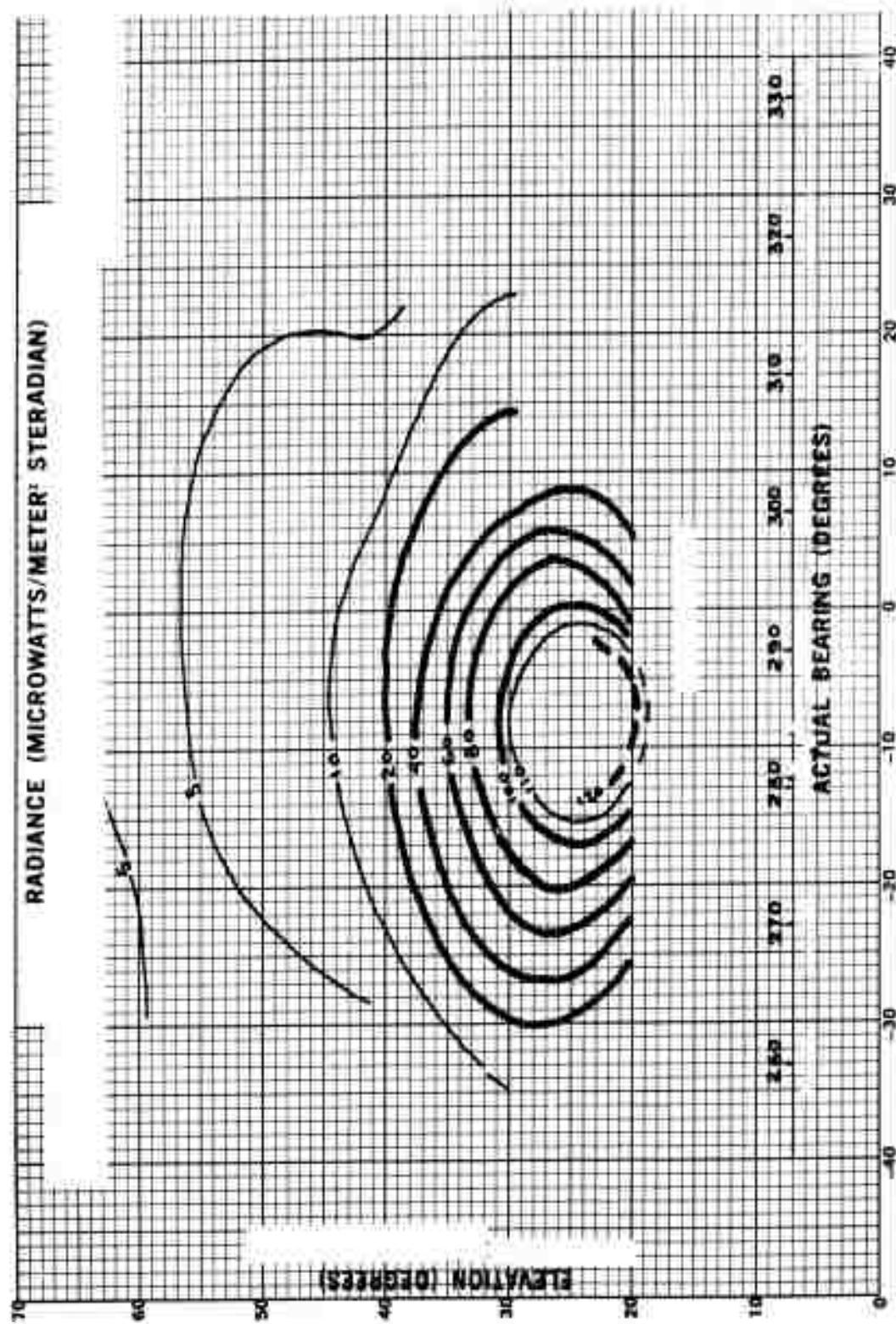


Figure 3.593 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 1,013 sec.

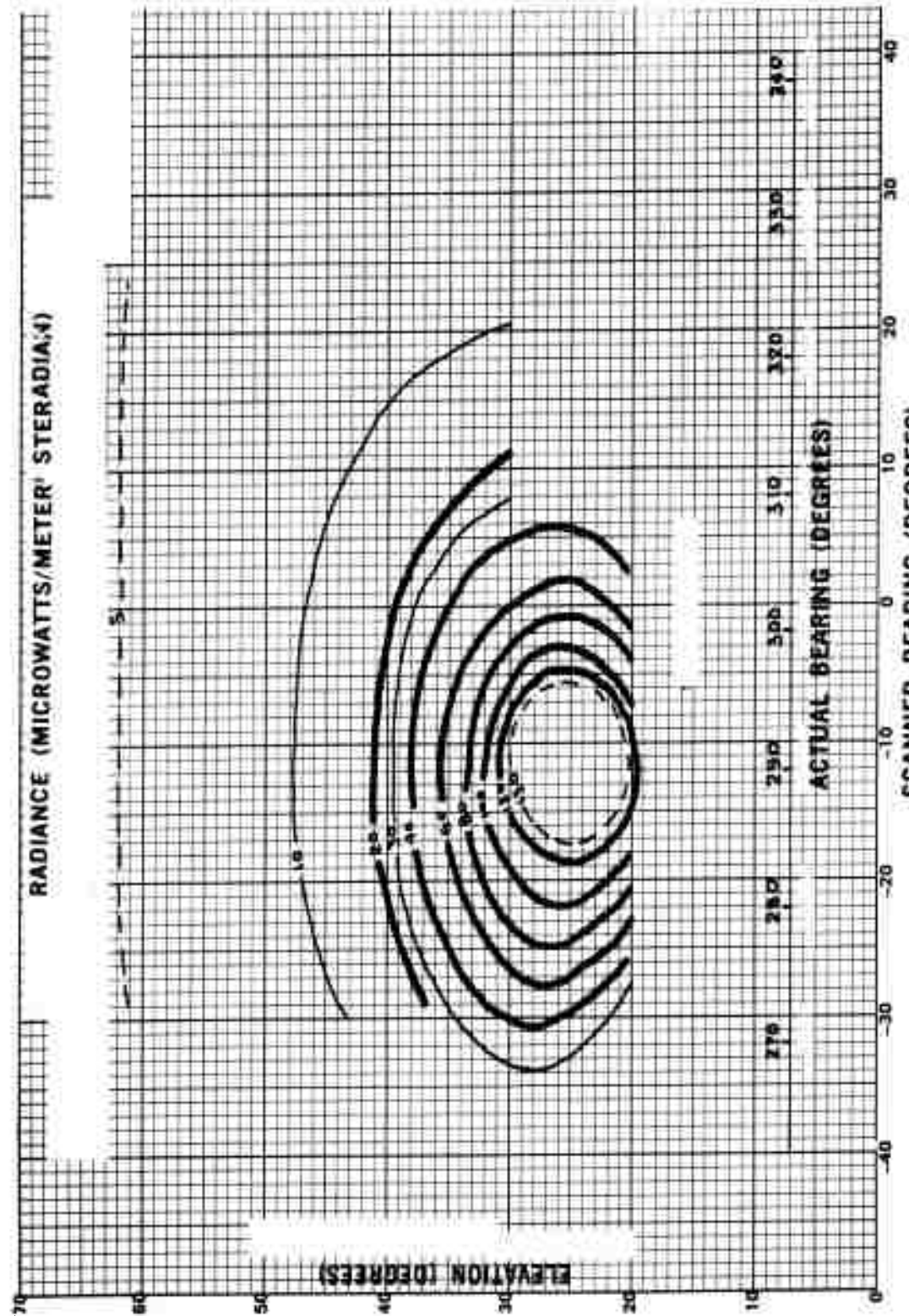


Figure 3.594 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H+1,101 sec.

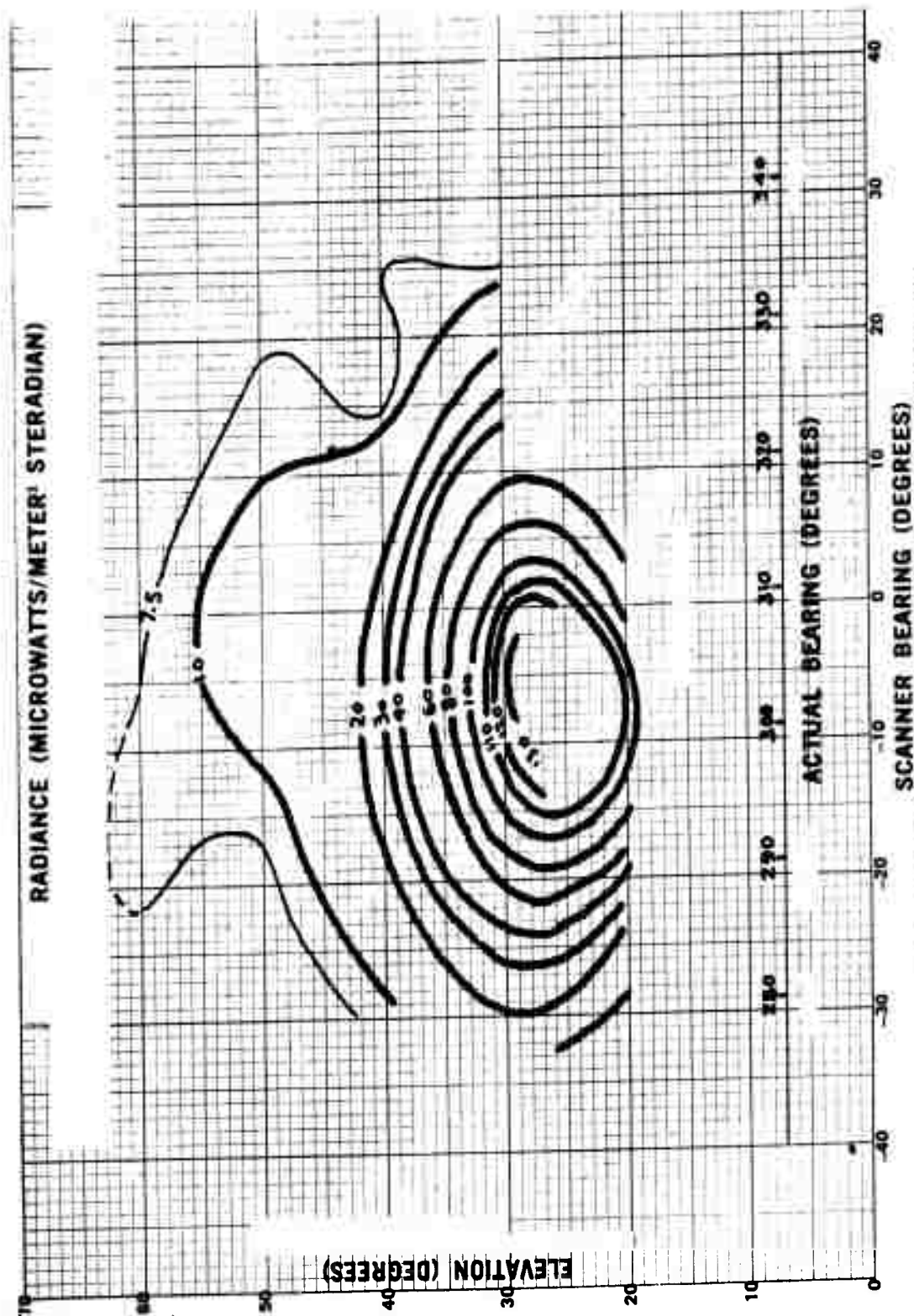


Figure 3.695 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H = 1,236 sec.

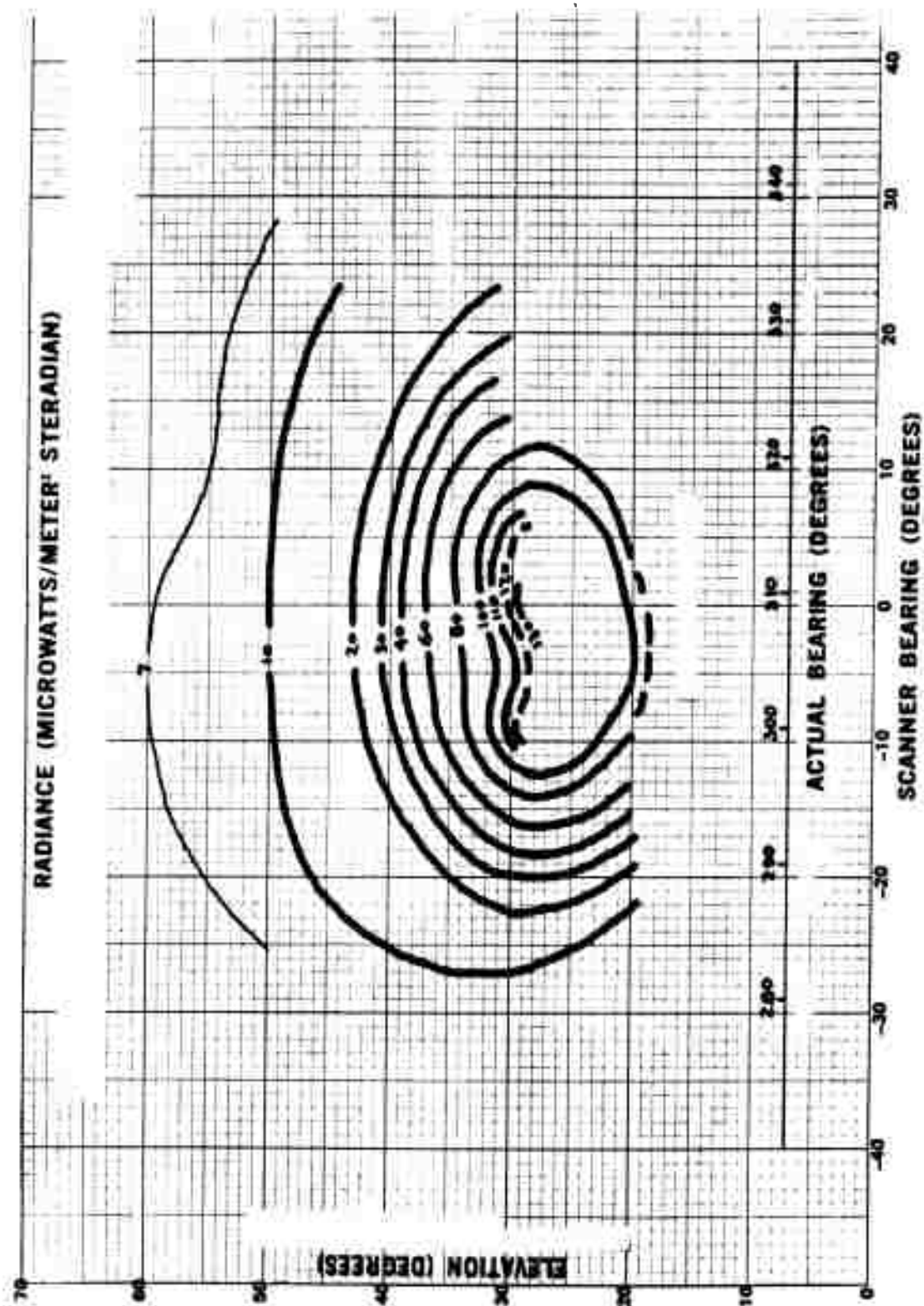


Figure 3.596 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron., H + 1,304 sec.

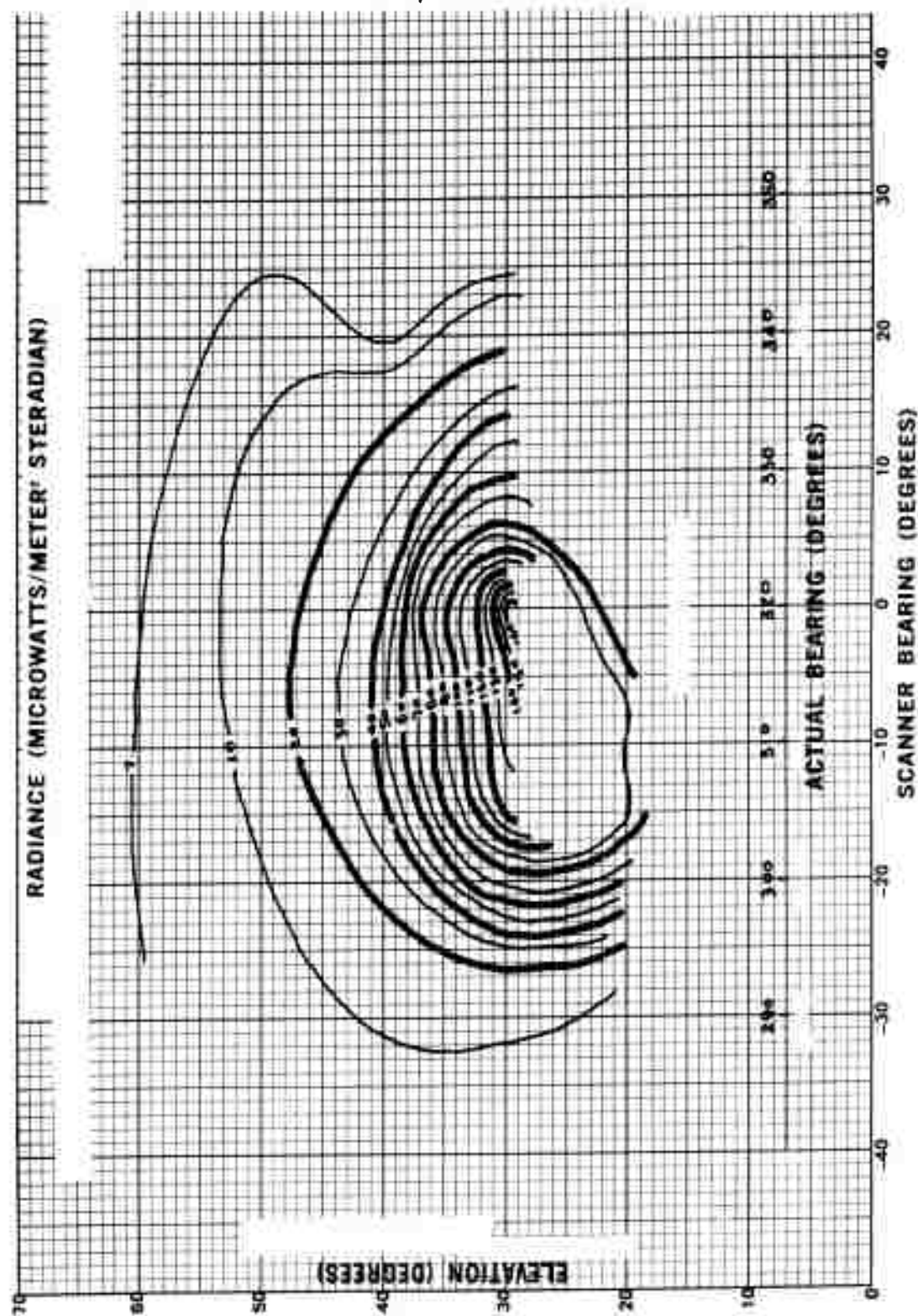


Figure 3.597 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 1.368 sec.

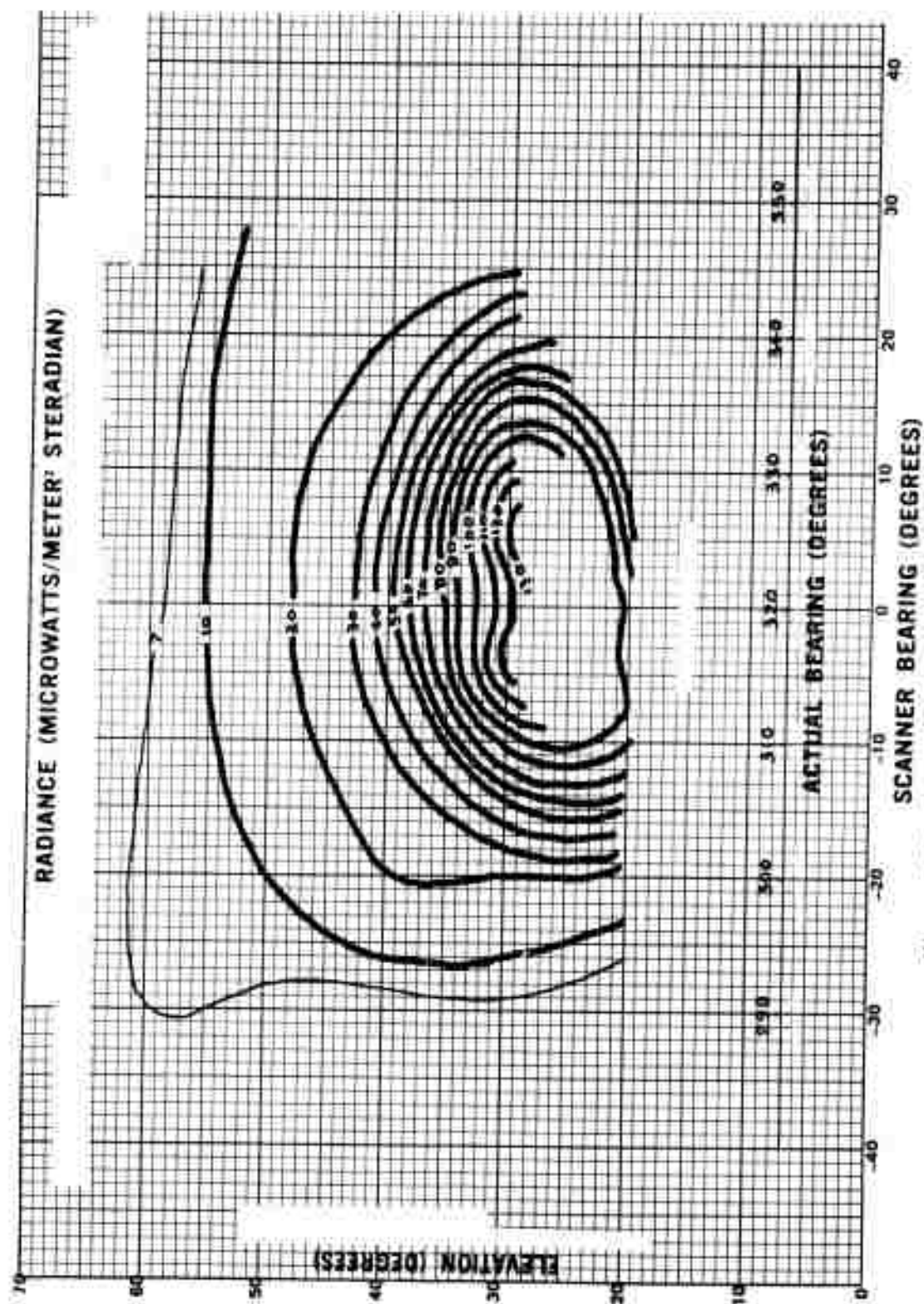


Figure 2.598 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 1.440 sec.

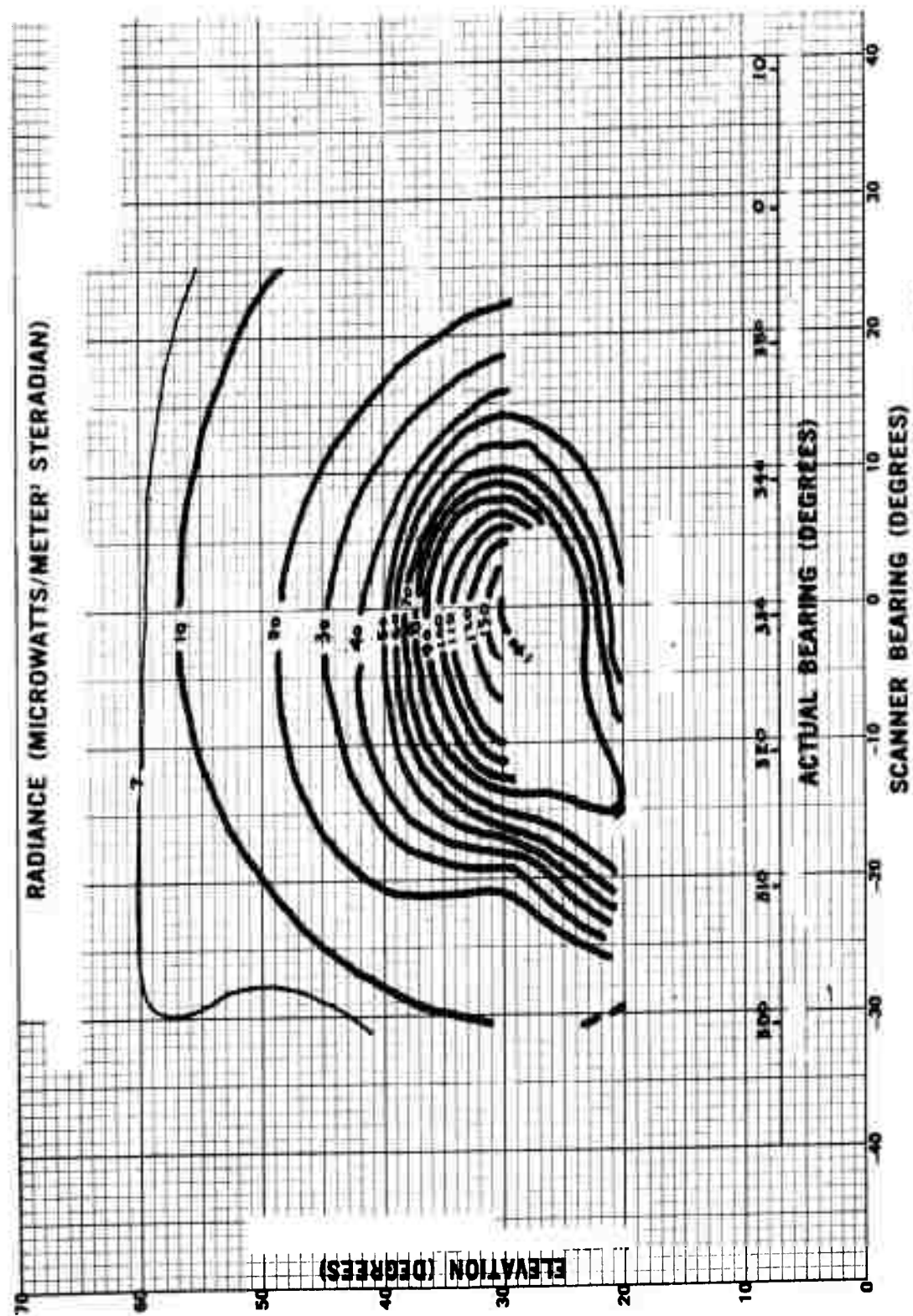


Figure 3.539 Sky radiance, Kettle I, King Fish, 0.550 to 0.613 micron, H+1,008 sec.

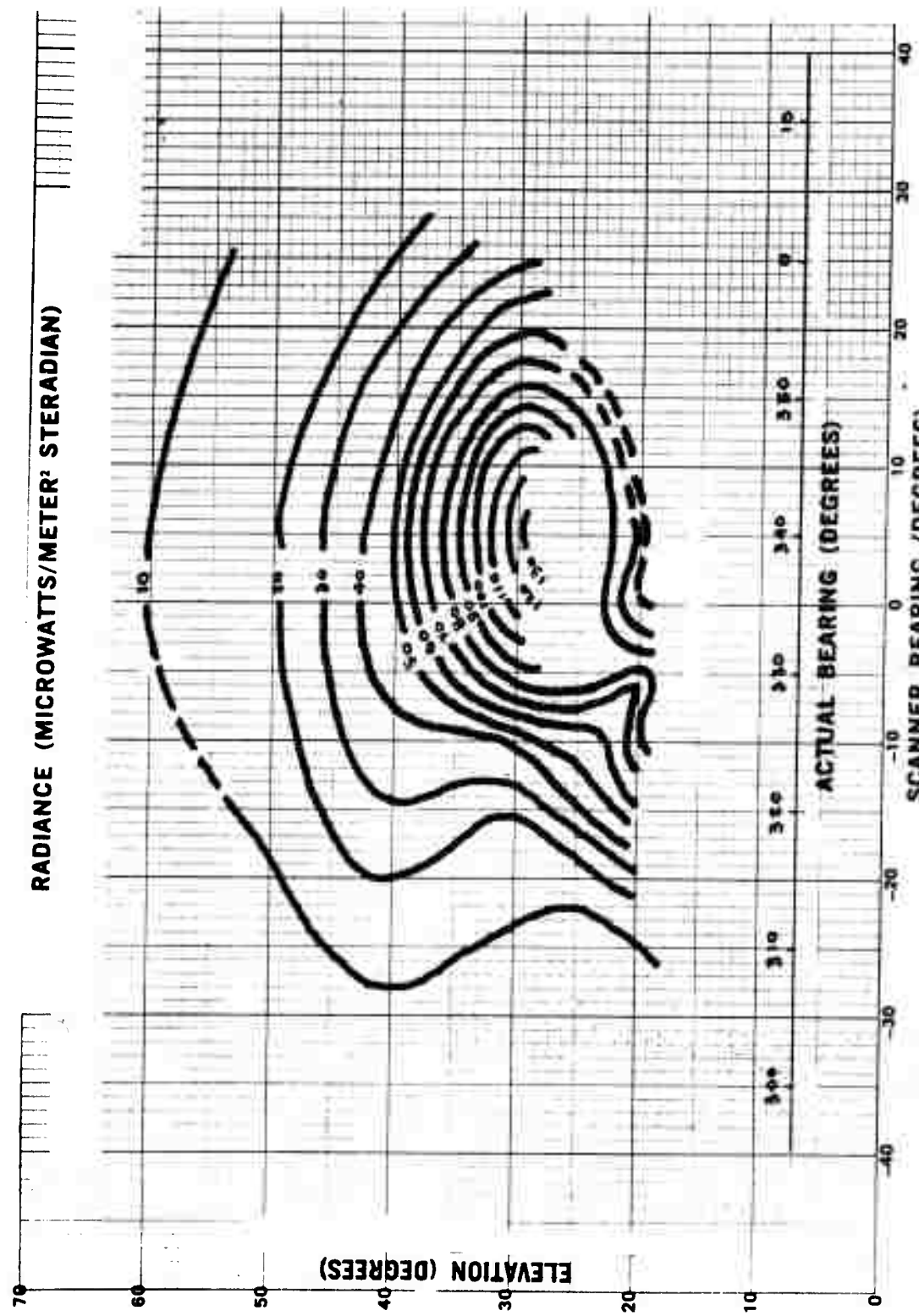


Figure 3.600 Sky radiance, Kettle I, King Fish, 0.600 to 0.613 micron, $H = 1.575$ sec.

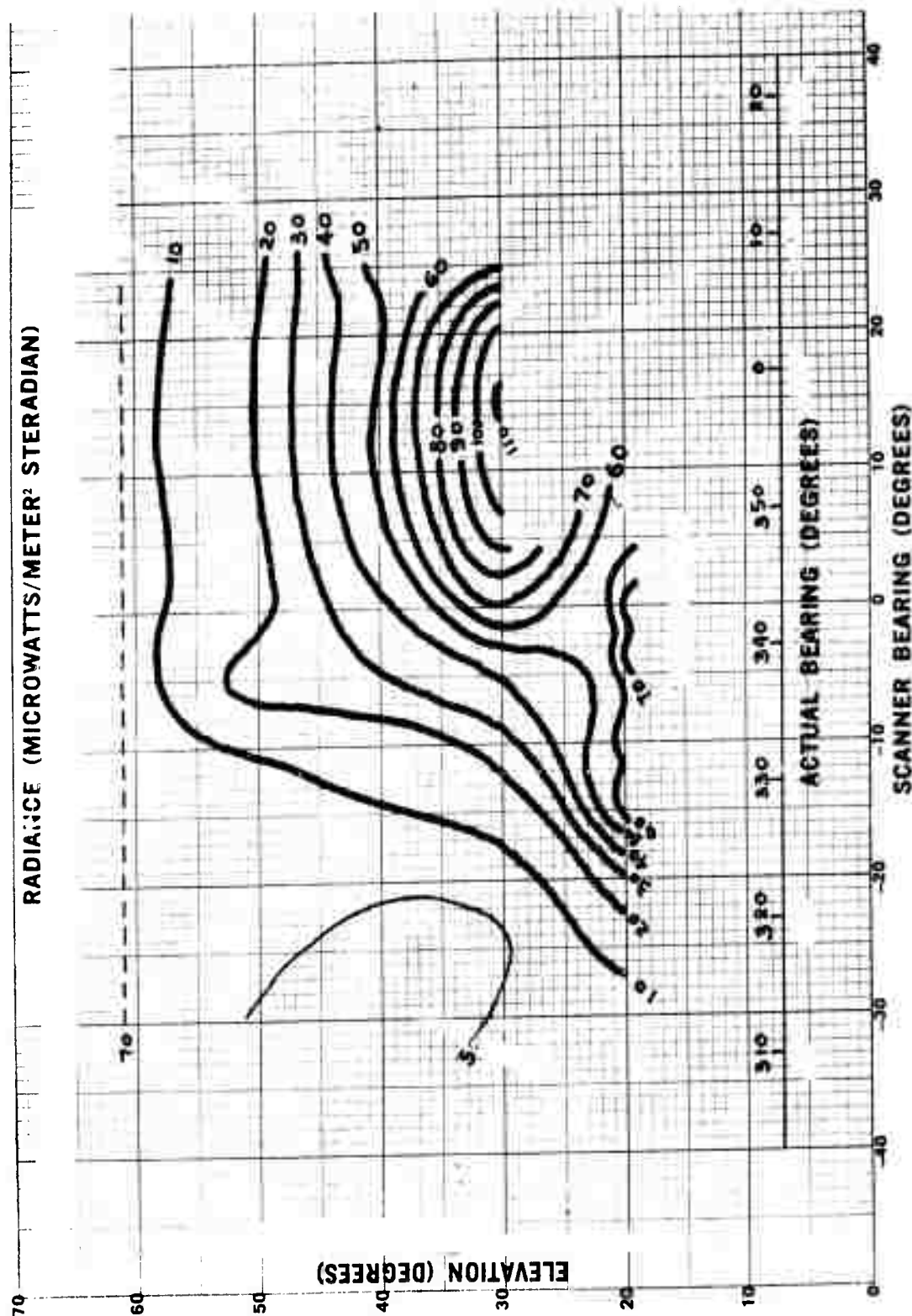


Figure 3.601 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H+1,711 sec.

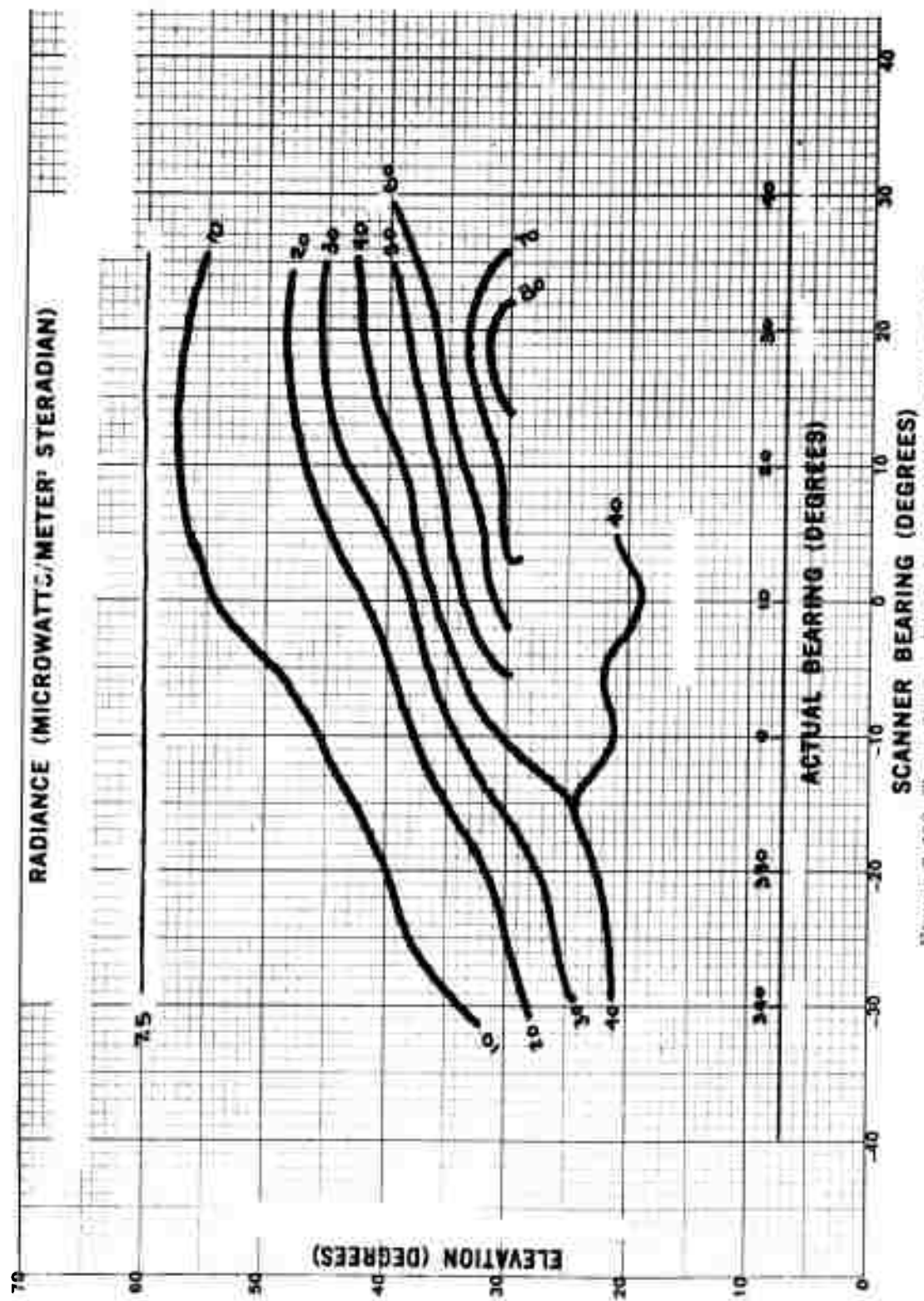


Figure 3.602 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 1,082 sec.

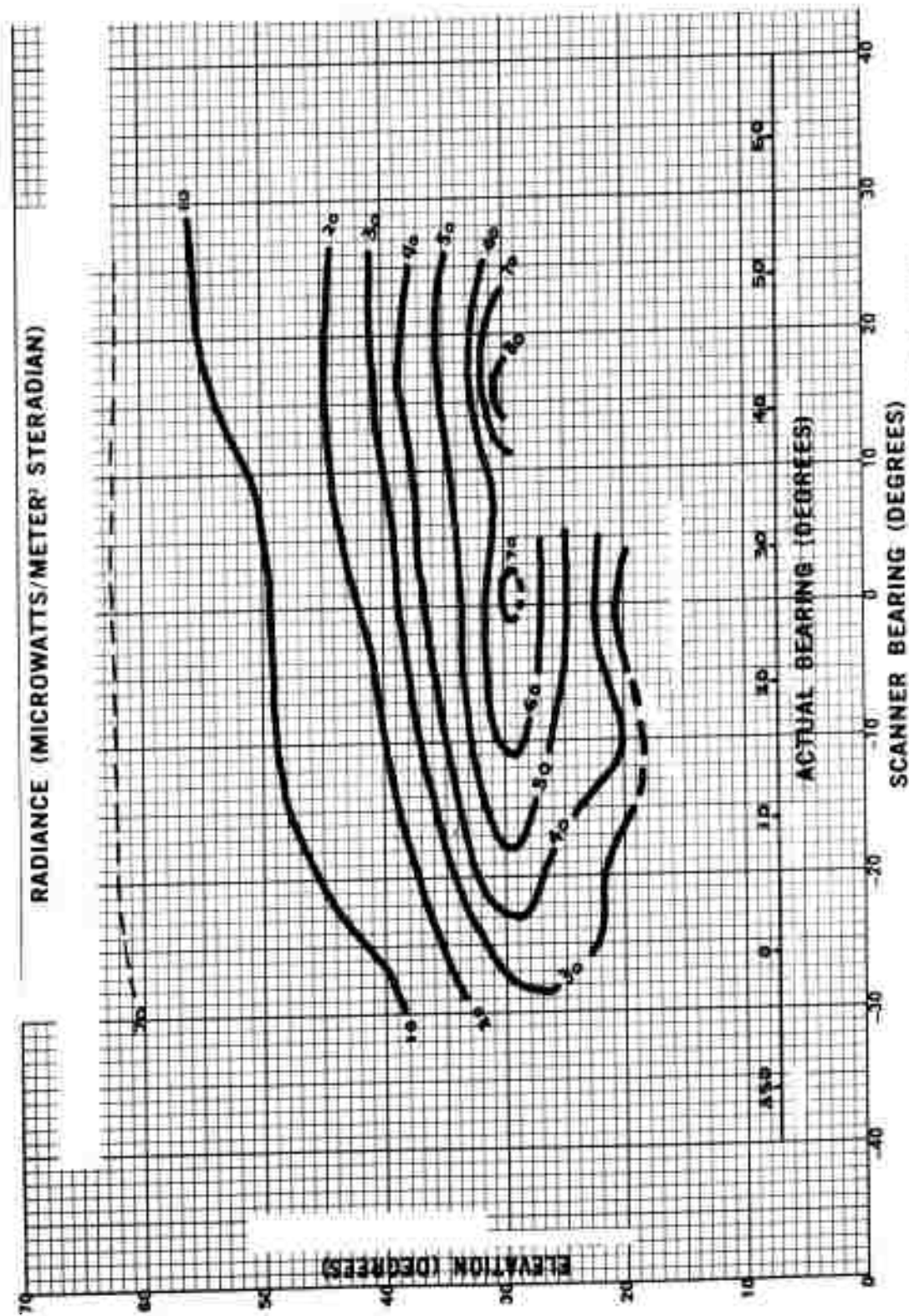


Figure 3.603 Sky radiance, Kettle I, King Fish, 0.520 to 0.613 micron, H + 2.118 sec.

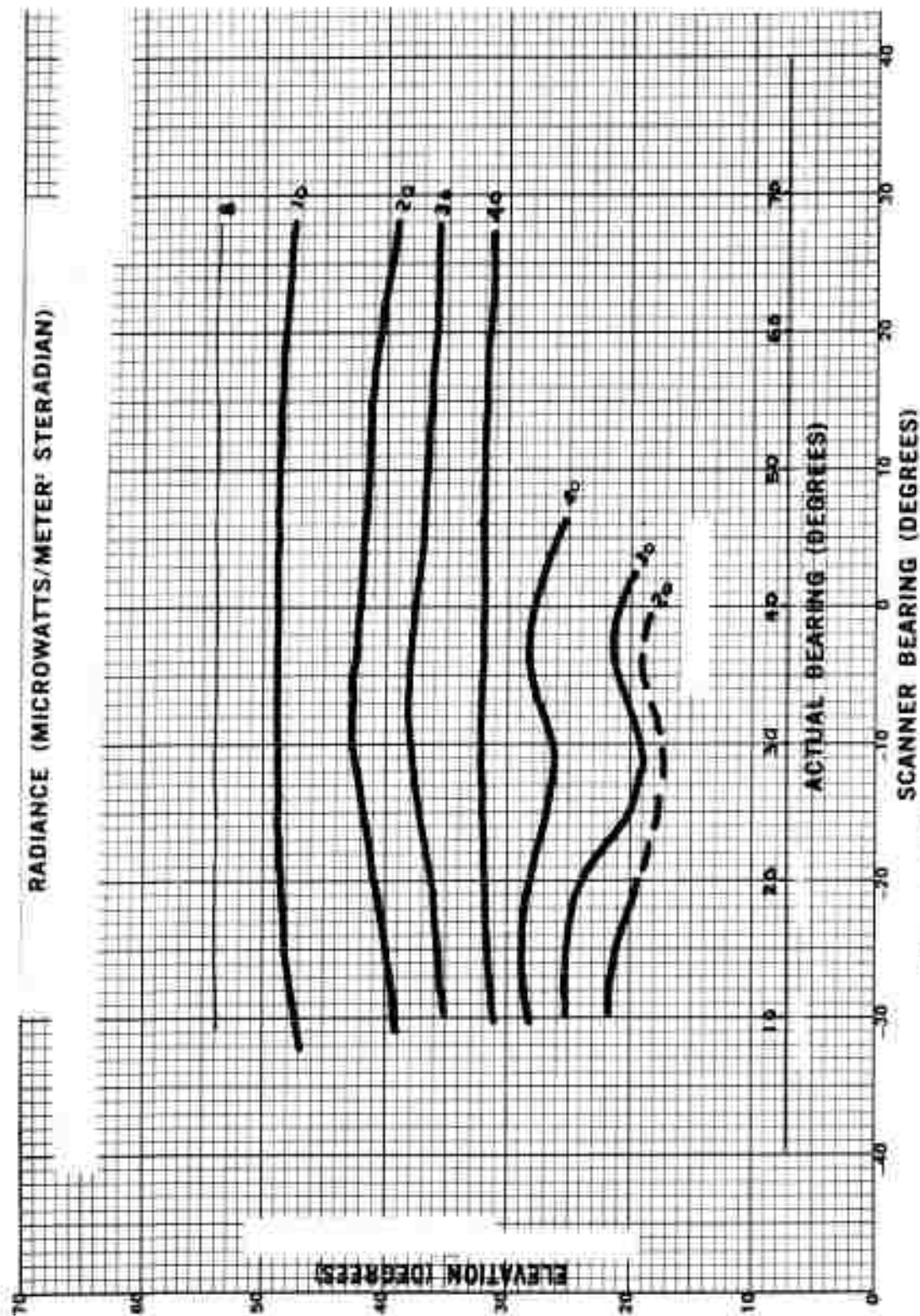


Figure 3.604 Sky radiance, Kettle 1, King Fish, 0.590 to 0.613 micron, H + 2,321 sec.

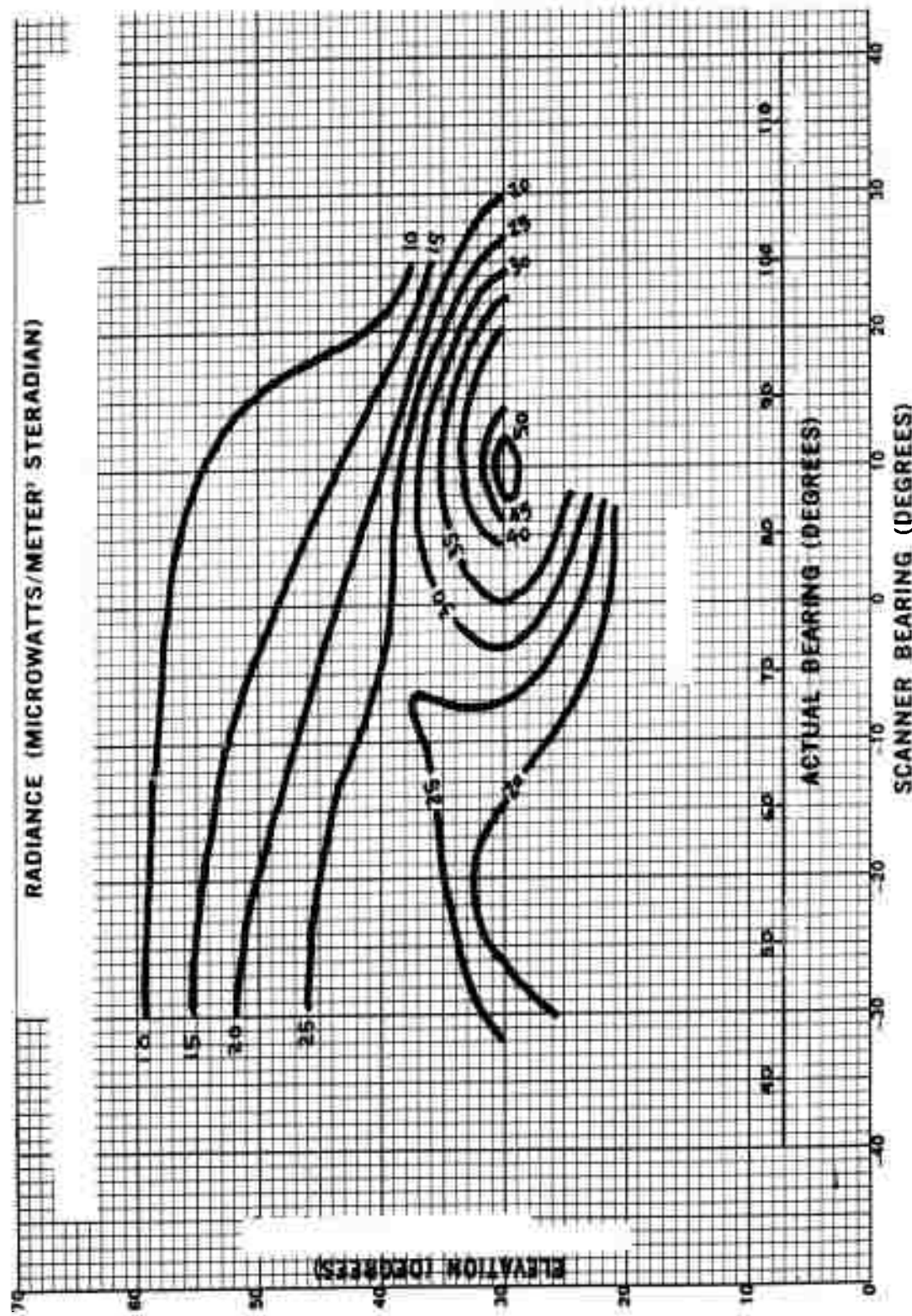
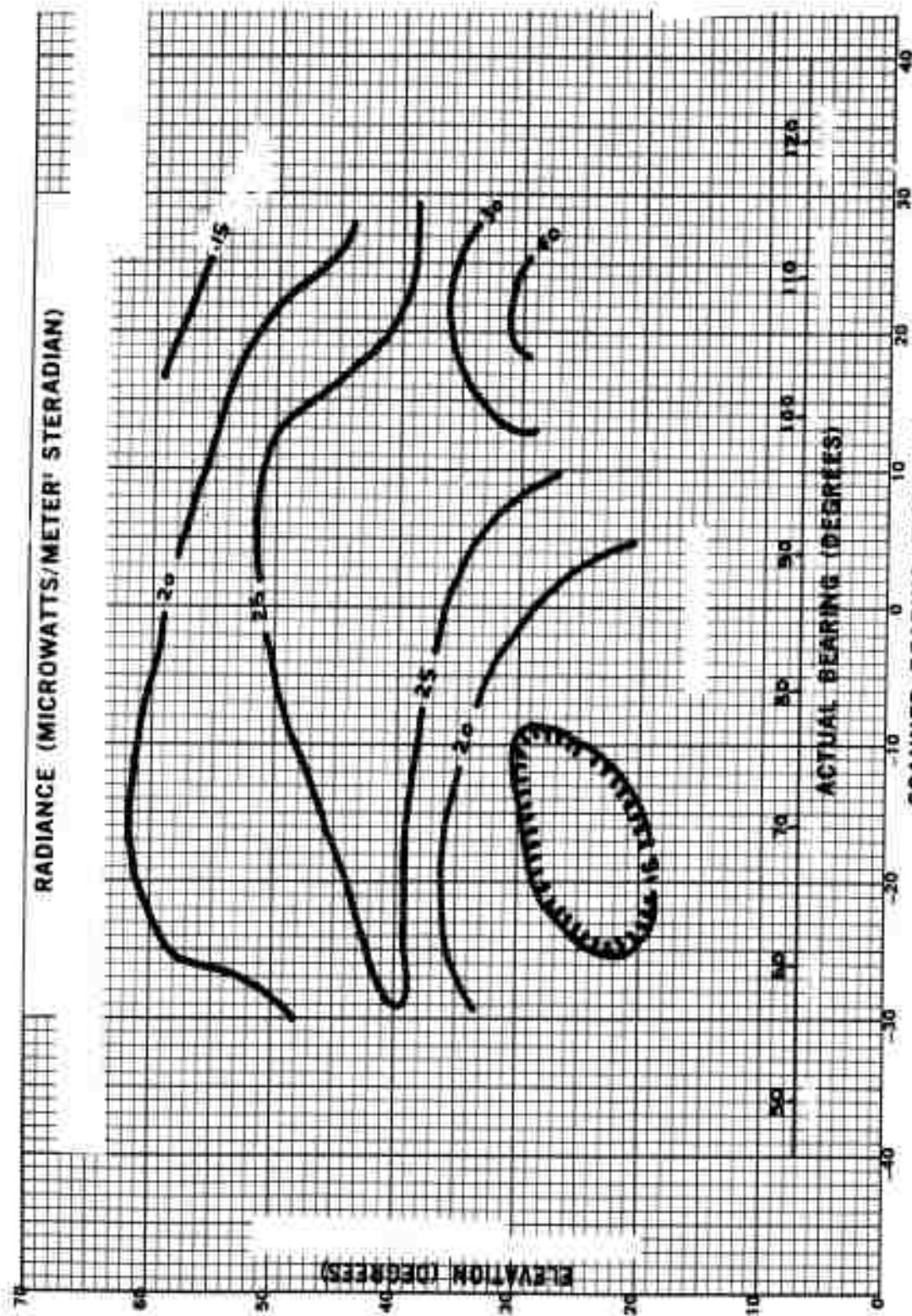


Figure 3.605 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 2,592 sec.



SCANNER BEARING (DEGREES)

Figure 3.606 Sky radiance, Kettle 1, King Fish, 0.590 to 0.613 micron, H + 2.795 sec.

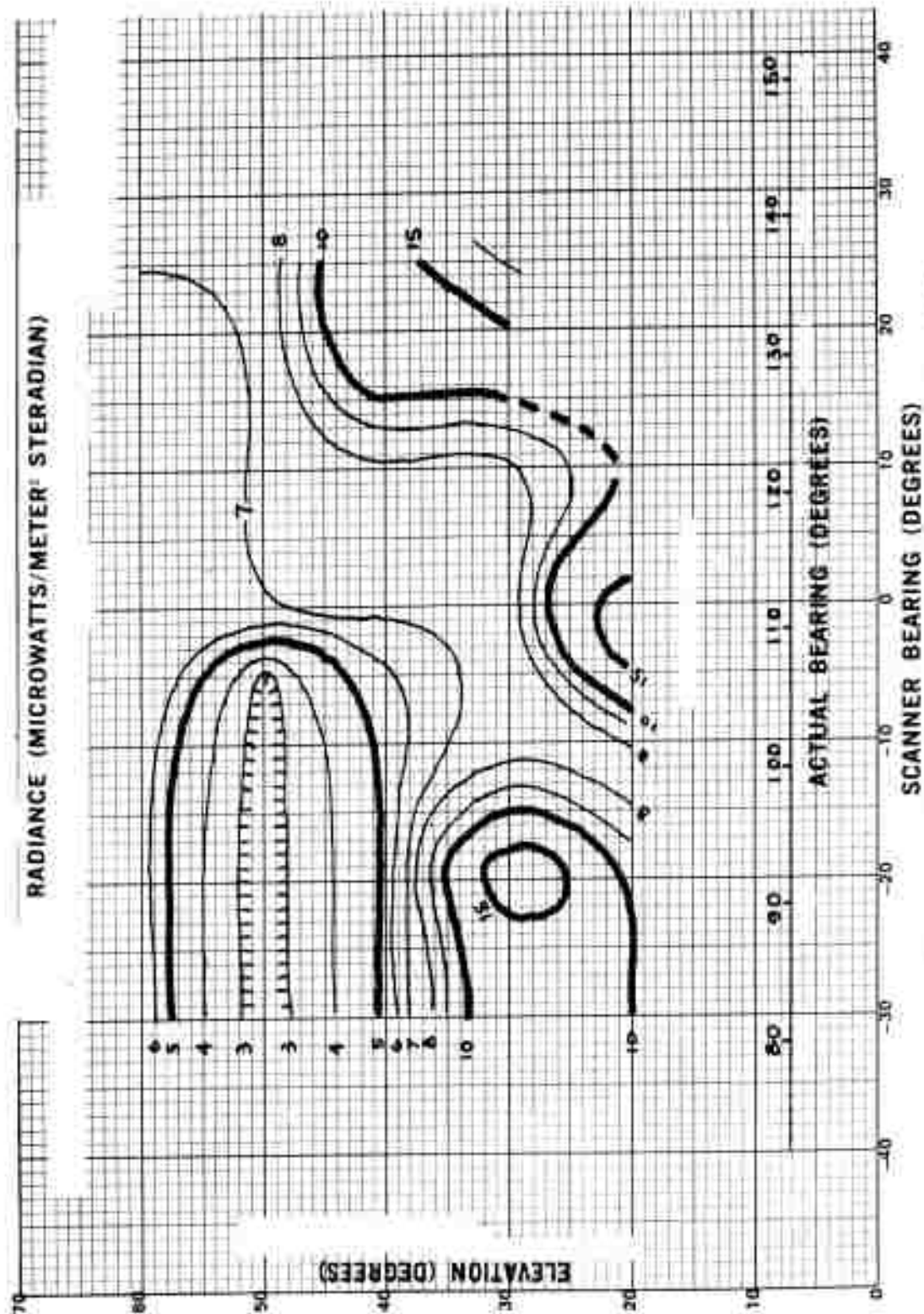


Figure 3.607 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 0.134 sec.

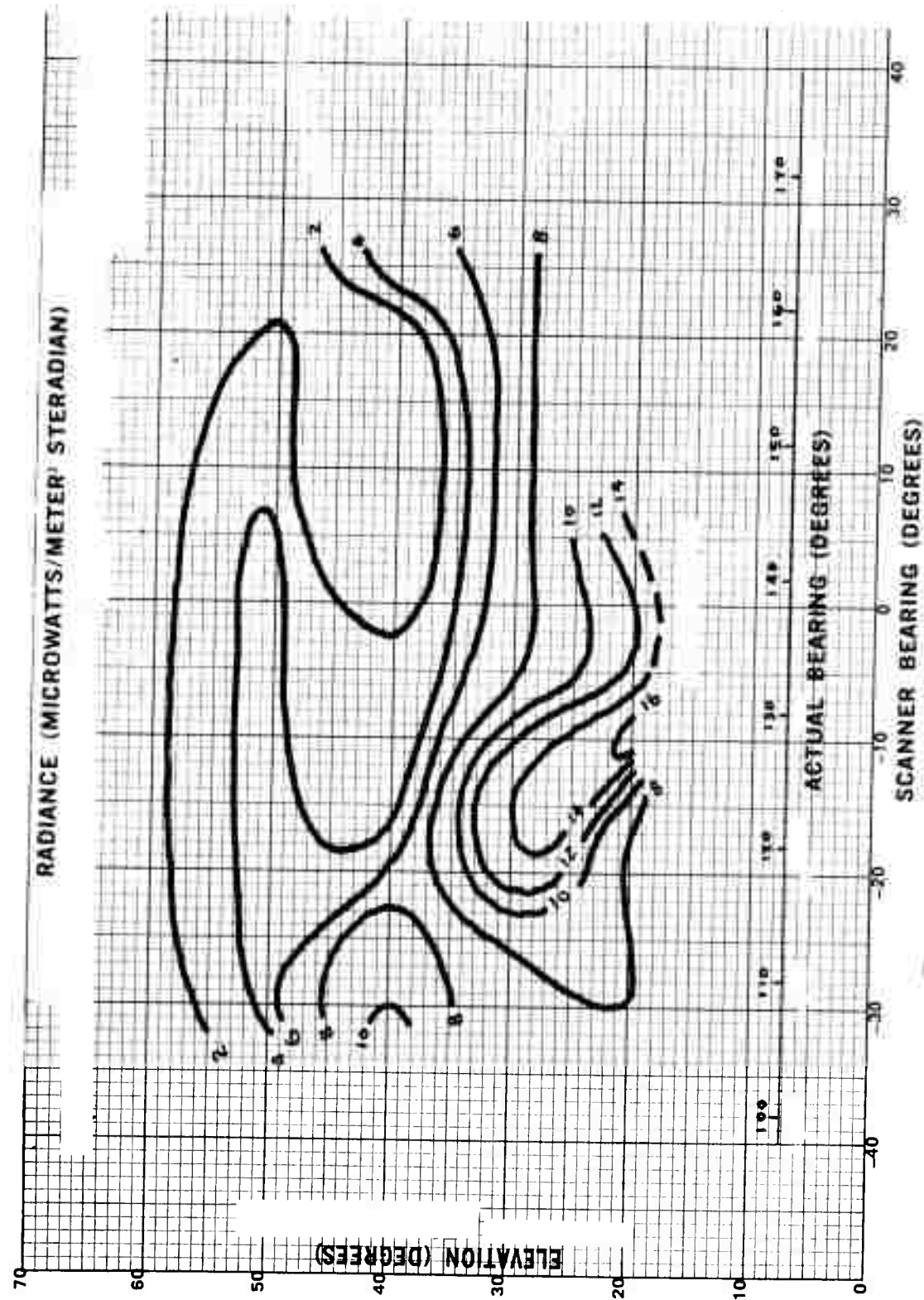


Figure 3-508. Sky radiance, Kettle I, King Flab, 0.590 to 0.613 micron, H + 3.406 sec.

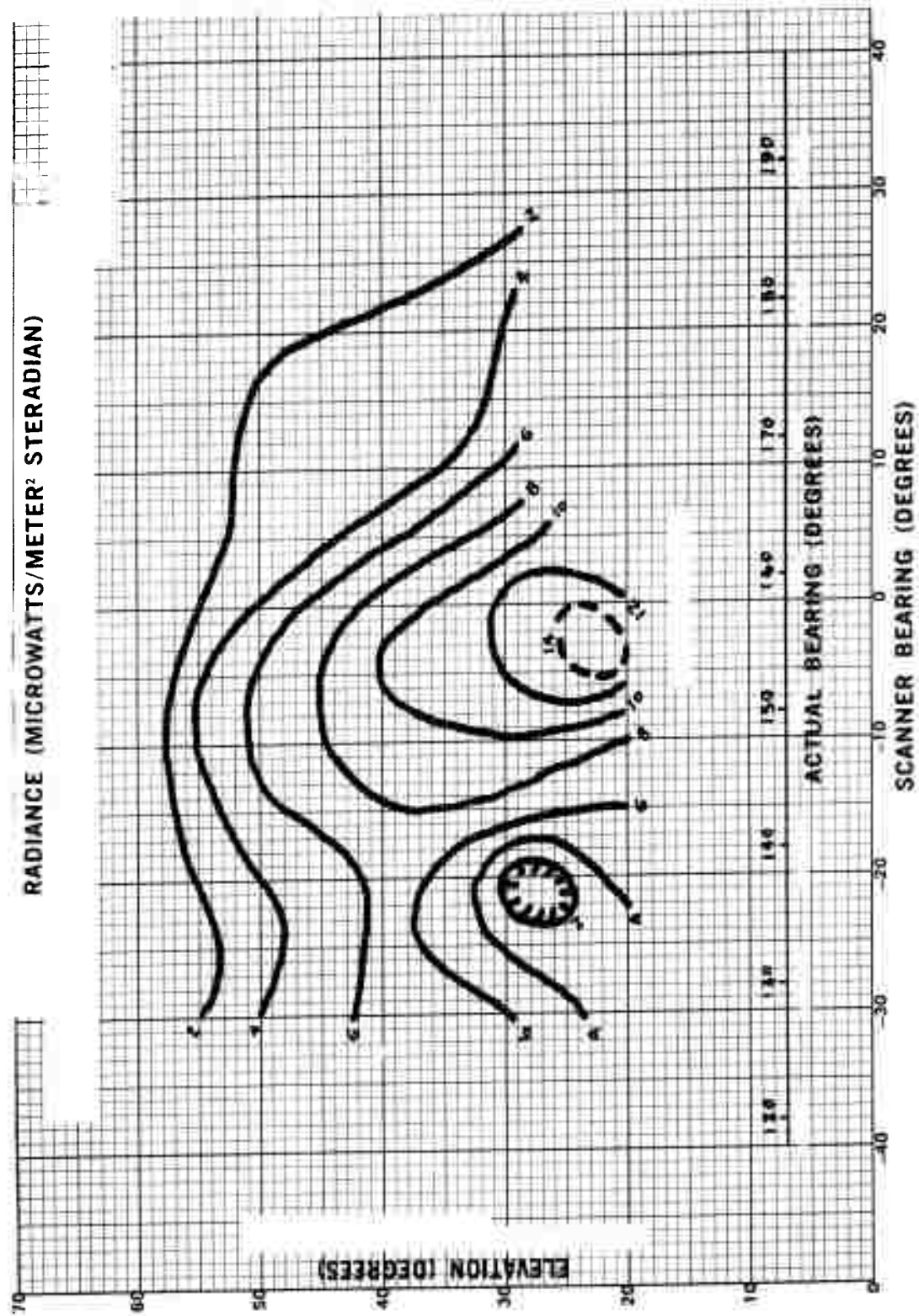


Figure 3.609 Sky radiance, Kettle I, King Fish, 0.590 to 0.613 micron, H + 3,677 sec.

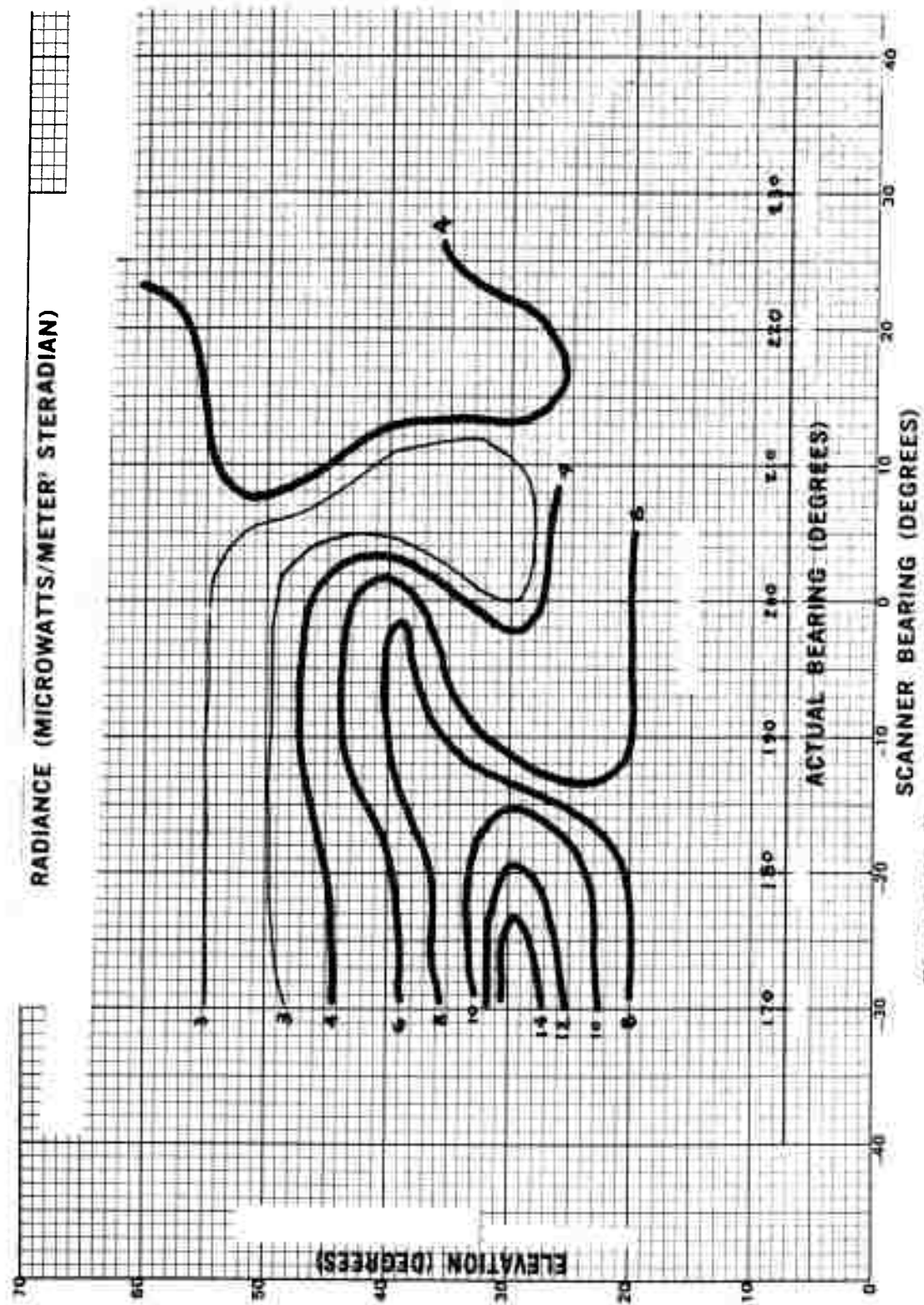


Figure 3.510 Sky radiance, Kaula I, King Fish, 0.590 to 0.613 micron, H + 3,948 800.

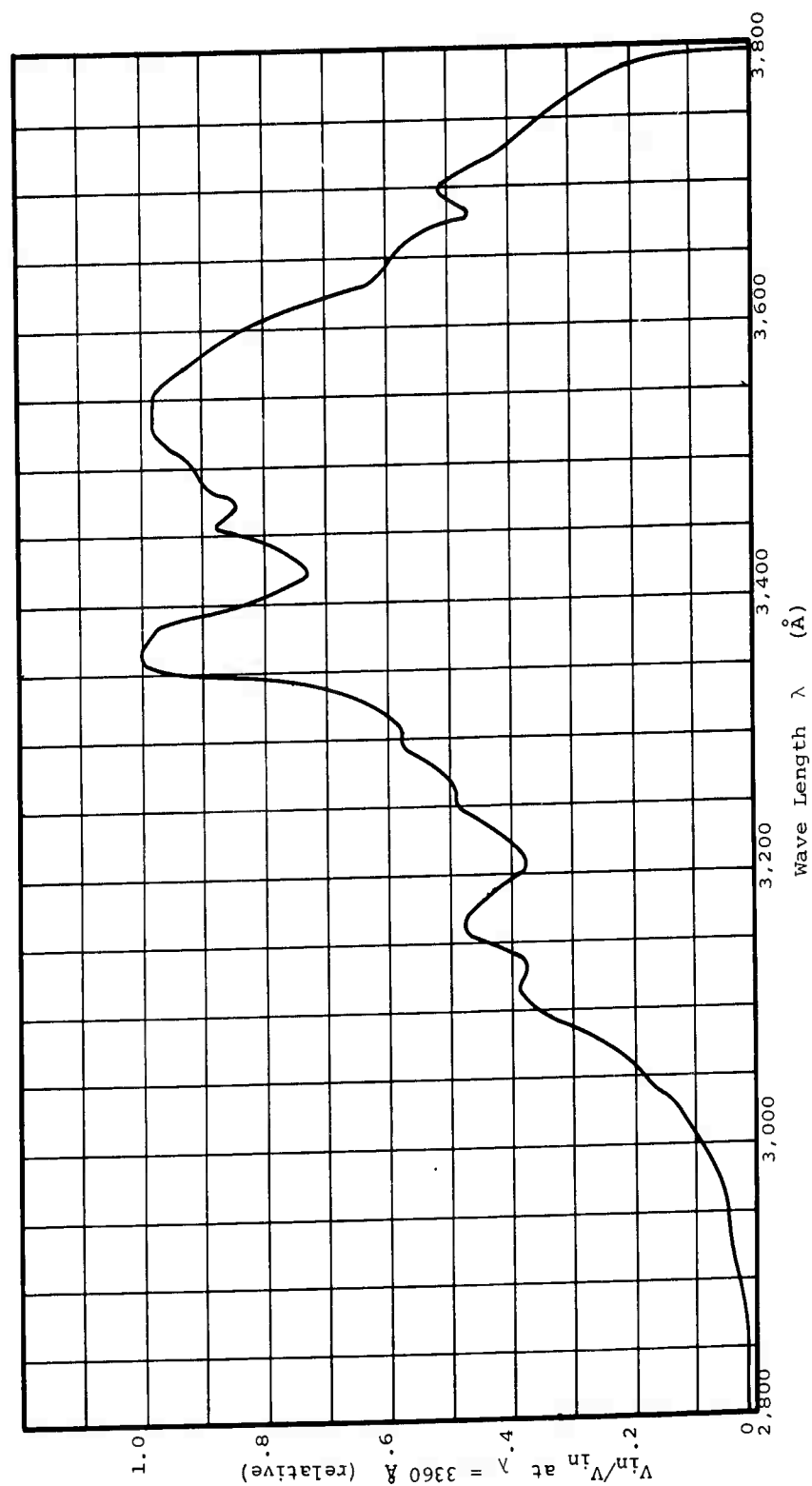
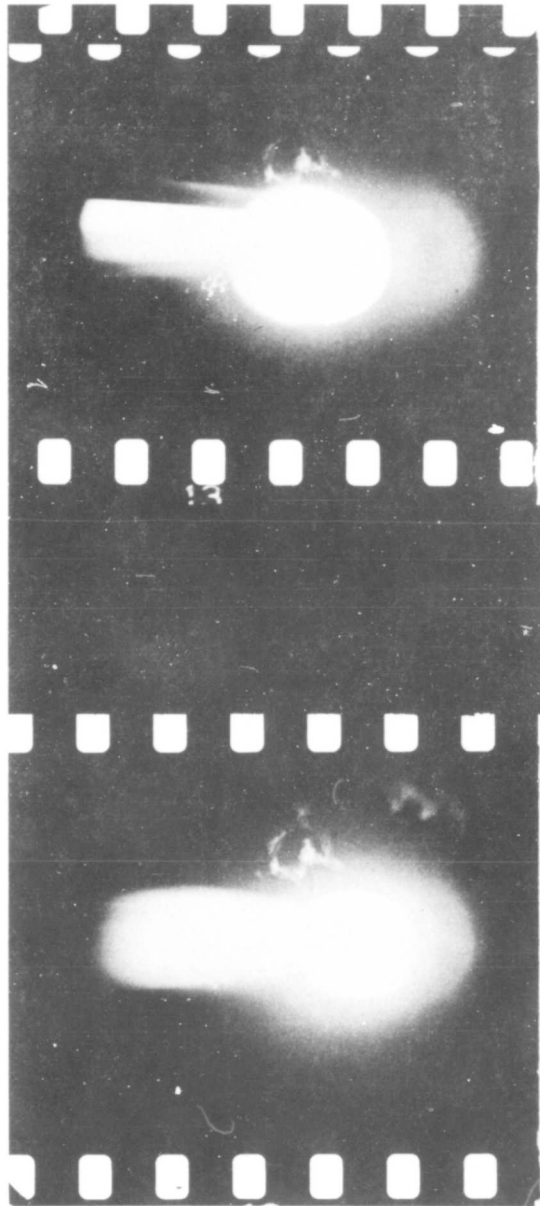
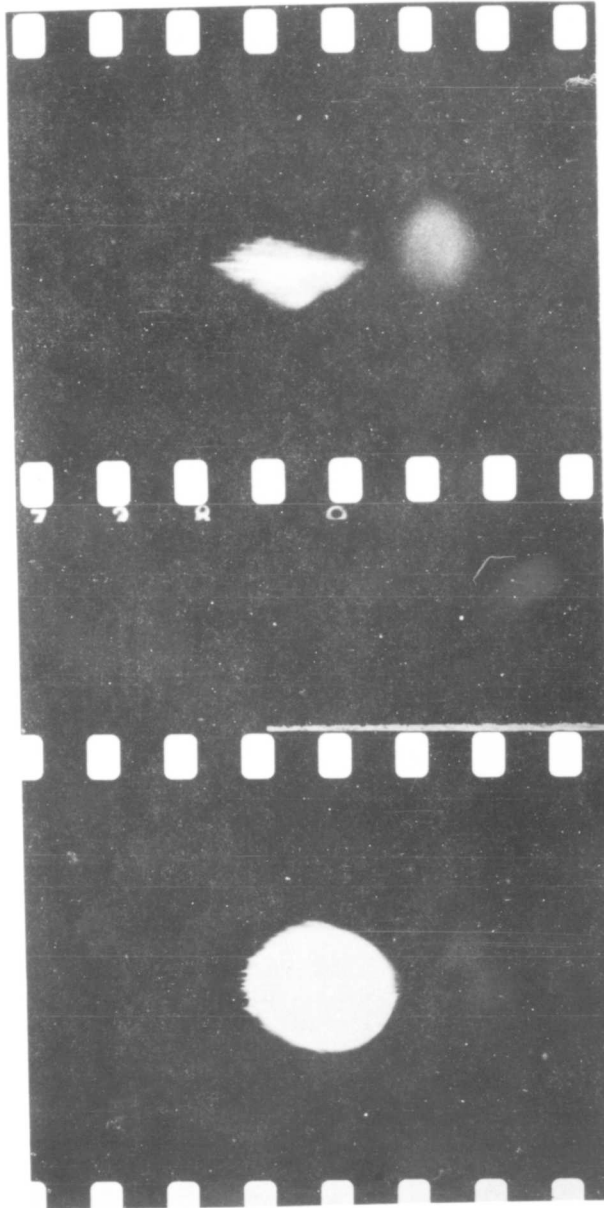


Figure 3.611 Normalized UV spectrogram at H + 34 seconds,
Kettle I, King Fish.



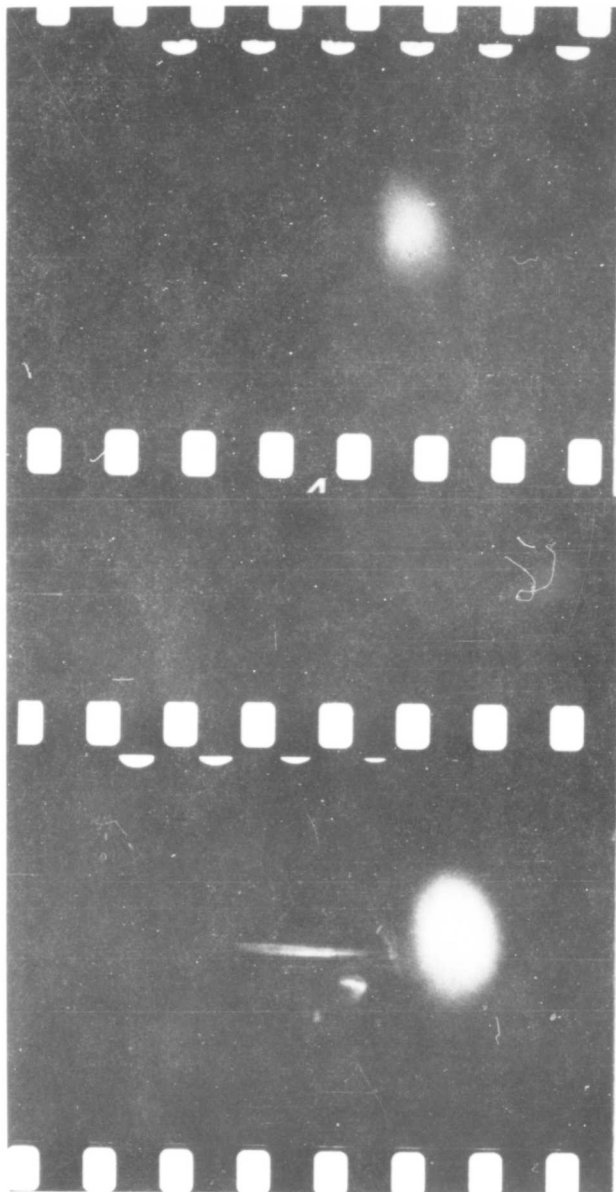
Left 9.5 to 13.5 sec-Right 20.0 to 30.0 sec
 Johnston - 118 km from burst
 T/2.0 - Super Anscochrome
 Frame Height 73°
 Center points 18° S of Vertical

Figure 3.612 35-mm photos from Johnston, King Fish,
 9.5 to 13.5 and 20.0 to 30.0 sec.



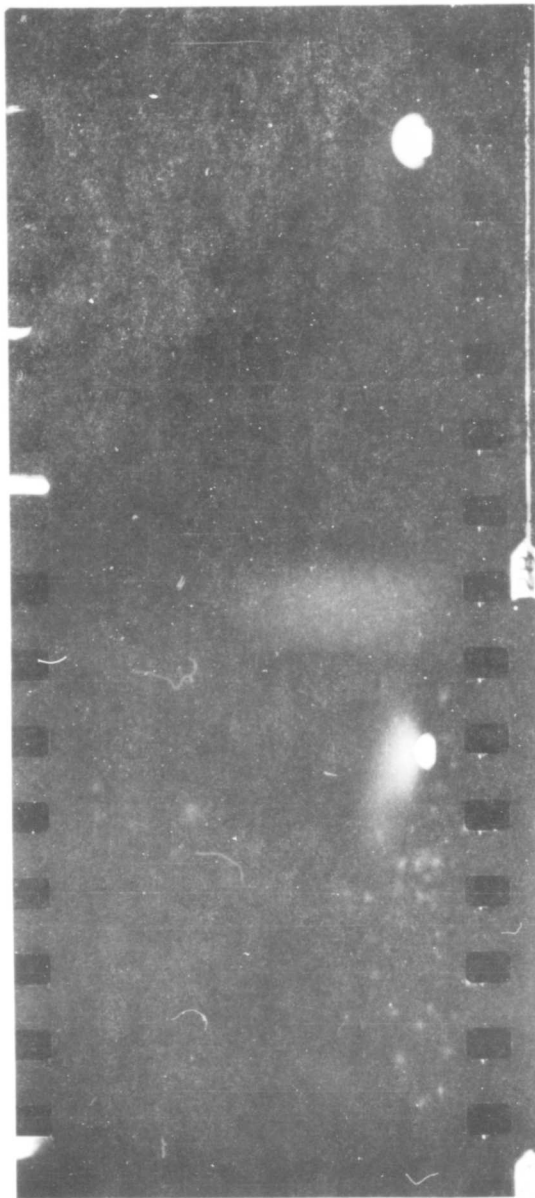
Left 53.0 to 63.0 sec-Right 108 to 133 sec
 Johnston - 118 km from burst
 T/2.0 - Super Anscochrome
 Frame Height 73
 Center points 18° S of Vertical

Figure 3.613 35-mm photos from Johnston, King Fish,
 53.0 to 63.0 and 108 to 133 sec.



Left 258 to 283 sec-Right 408 to 433 sec
 Johnston - 118 km from burst
 T/2.0 - Super Anscochrome
 Frame Height 730
 Center points 180 S of Vertical

Figure 3.614 35-mm photos from Johnston, King Fish,
 258 to 283 and 408 to 433 sec.



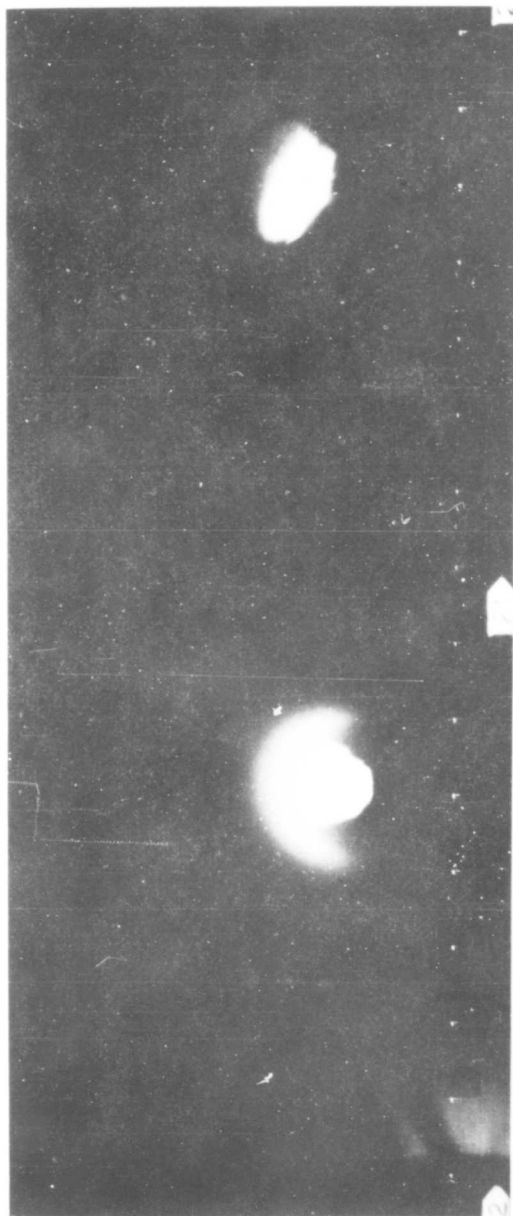
Right 8.1 to 18.1 sec-Left 18.6 to 28.6 sec
Maui - 1495 km to burst
T/1.8 - Tri-X
Frame Height 340

Figure 3.615 35-mm photos from Maui, King Fish,
8.1 to 18.1 and 18.6 to 28.6 sec.



Left 29.1 to 51.1 sec-Right 51.6 to 52.6 sec
Maui - 1495 km to burst
T/1.8 - Tri-X
Frame Height 34°

Figure 3.616 35-mm photos from Maui, King Fish,
29.1 to 51.1 and 51.6 to 52.6 sec.



Left 79 to 104 sec - Right 108 to 133 sec
Maui - 1495 km to burst
T/1.8 - Tri-X
Frame Height 34°

Figure 3.617 35-mm photos from Maui, King Fish,
79 to 104 and 108 to 133 sec.



Left 168 to 193 sec-Right 199 to 224 sec
Maui - 1495 km to burst
T/1.8 - Tri-X
Frame Height 34°

Figure 3.618 35-mm photos from Maui, King Fish,
168 to 193 and 199 to 224 sec.

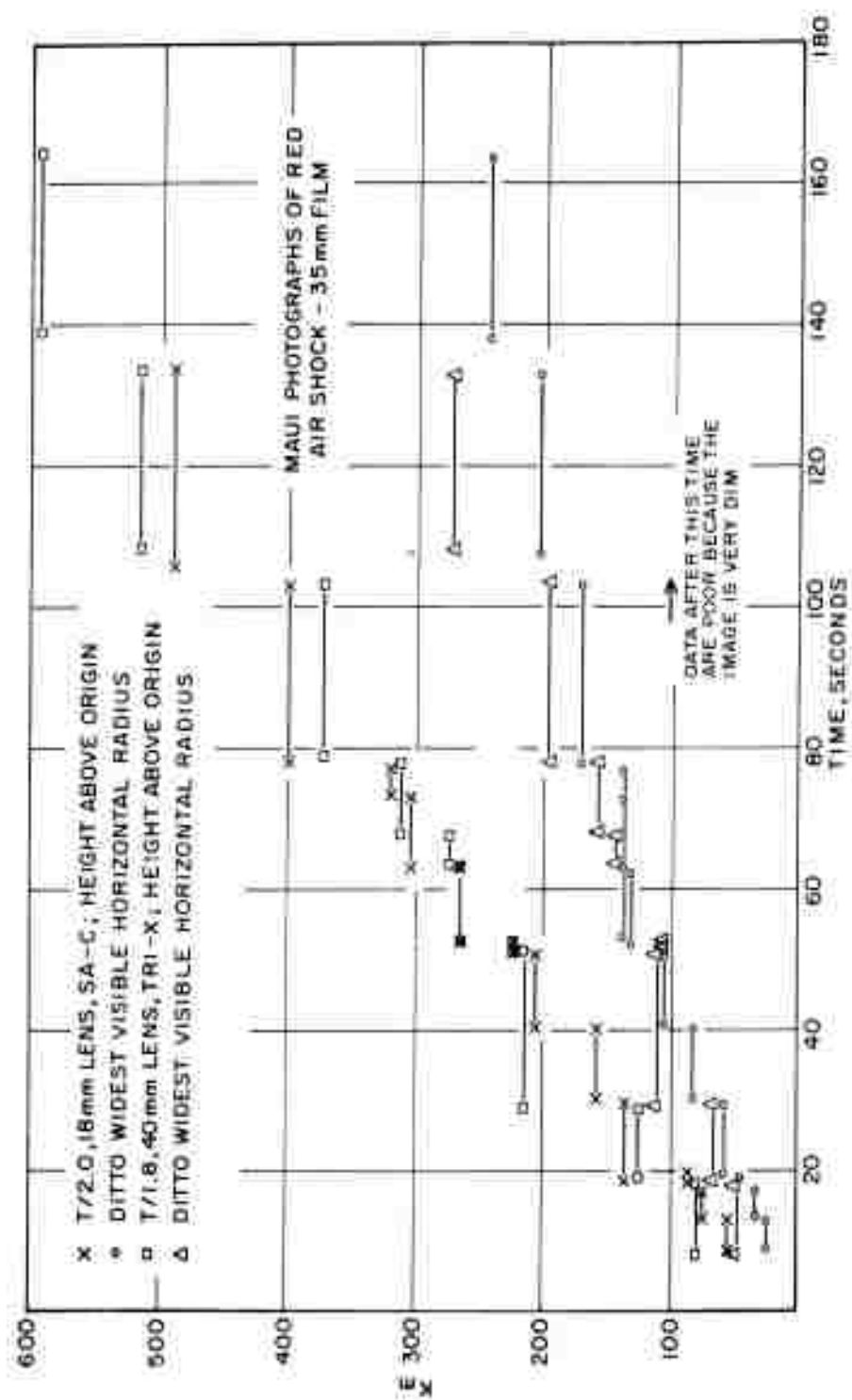


Figure 3.619 Dimensions of air shock as scaled from Maui photographs, King Fish.

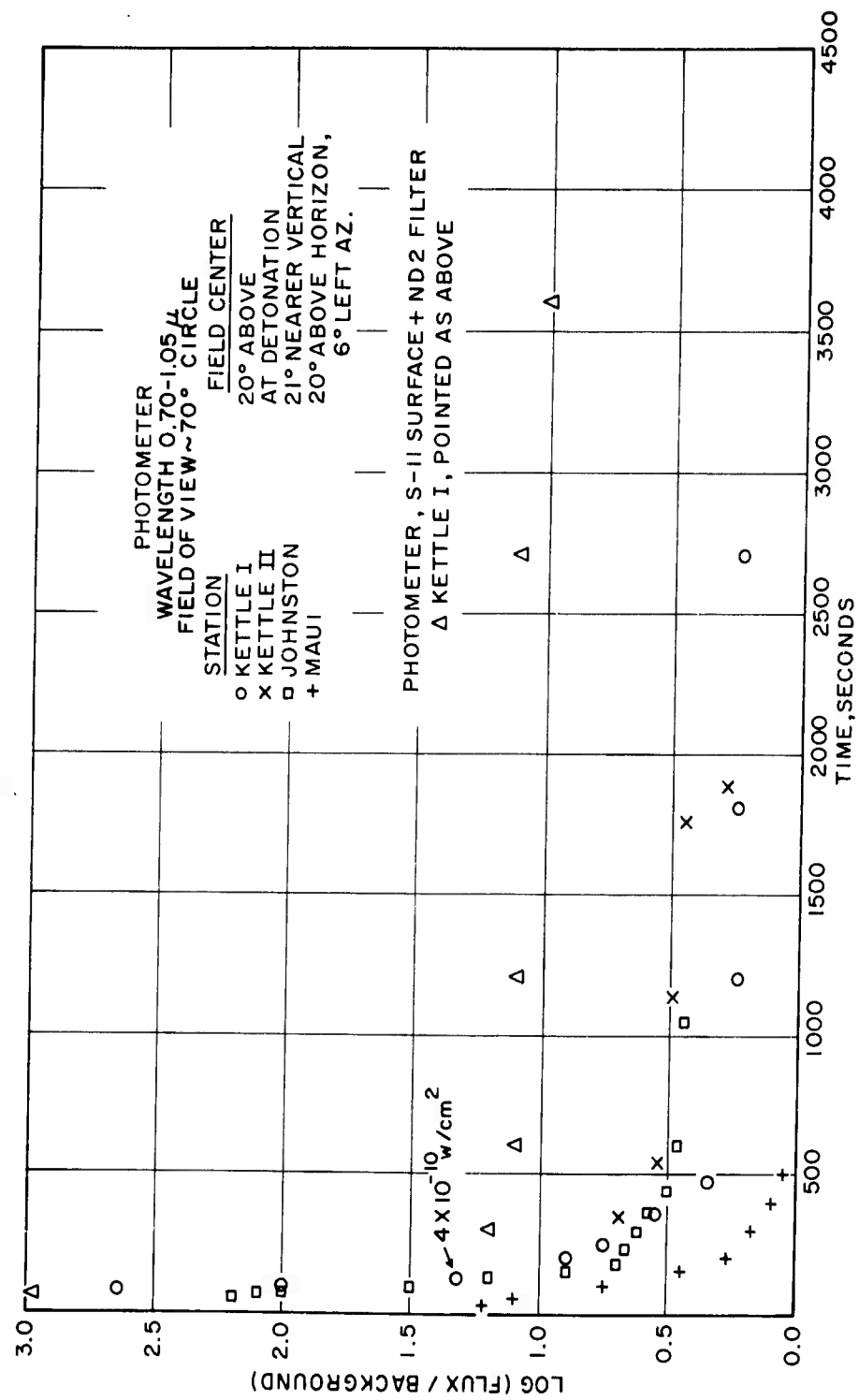


Figure 3.620 Photometer results (near-IR) from all stations, King Fish.

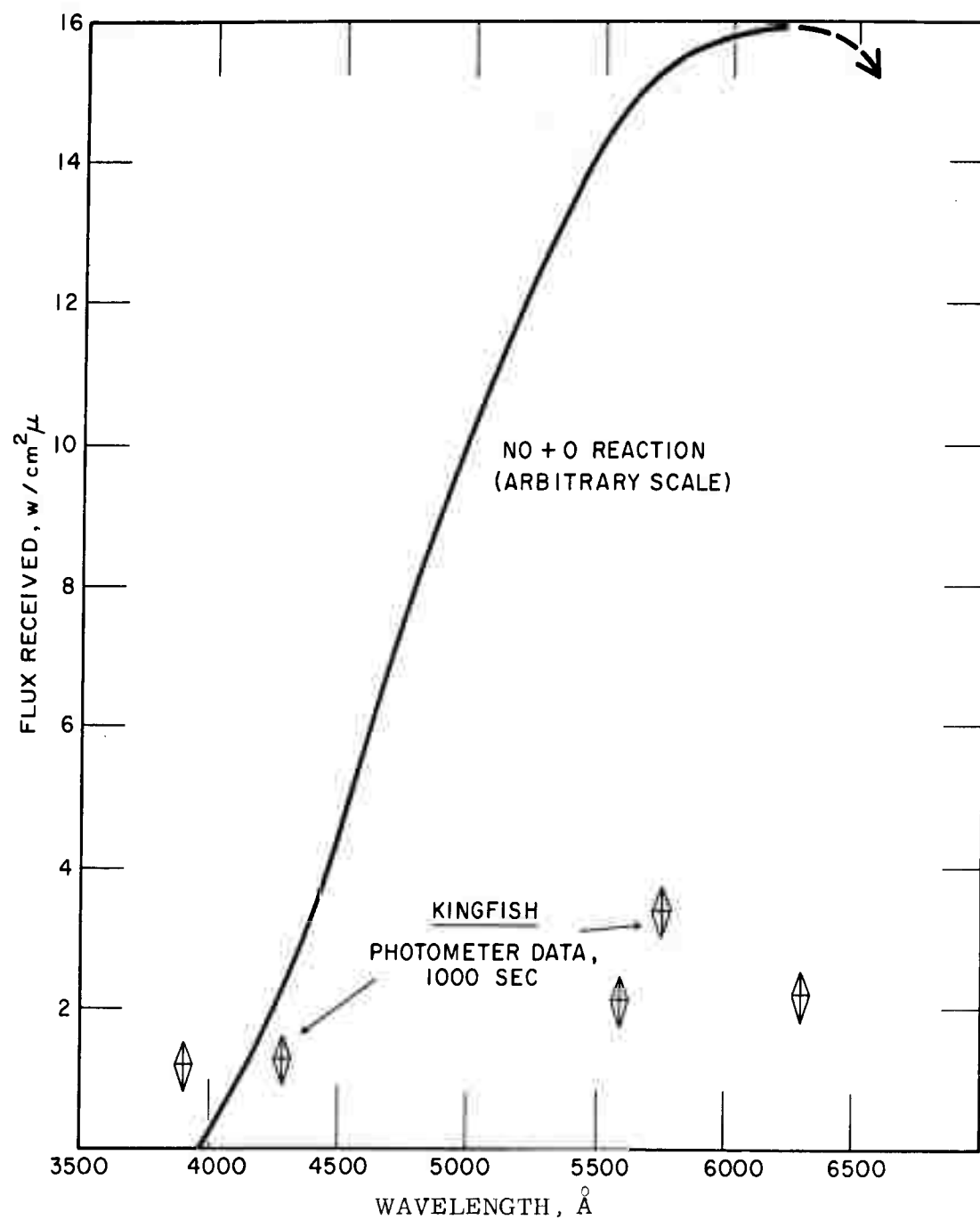


Figure 3.621 Photometer results (visible) at Kettle II, King Fish.

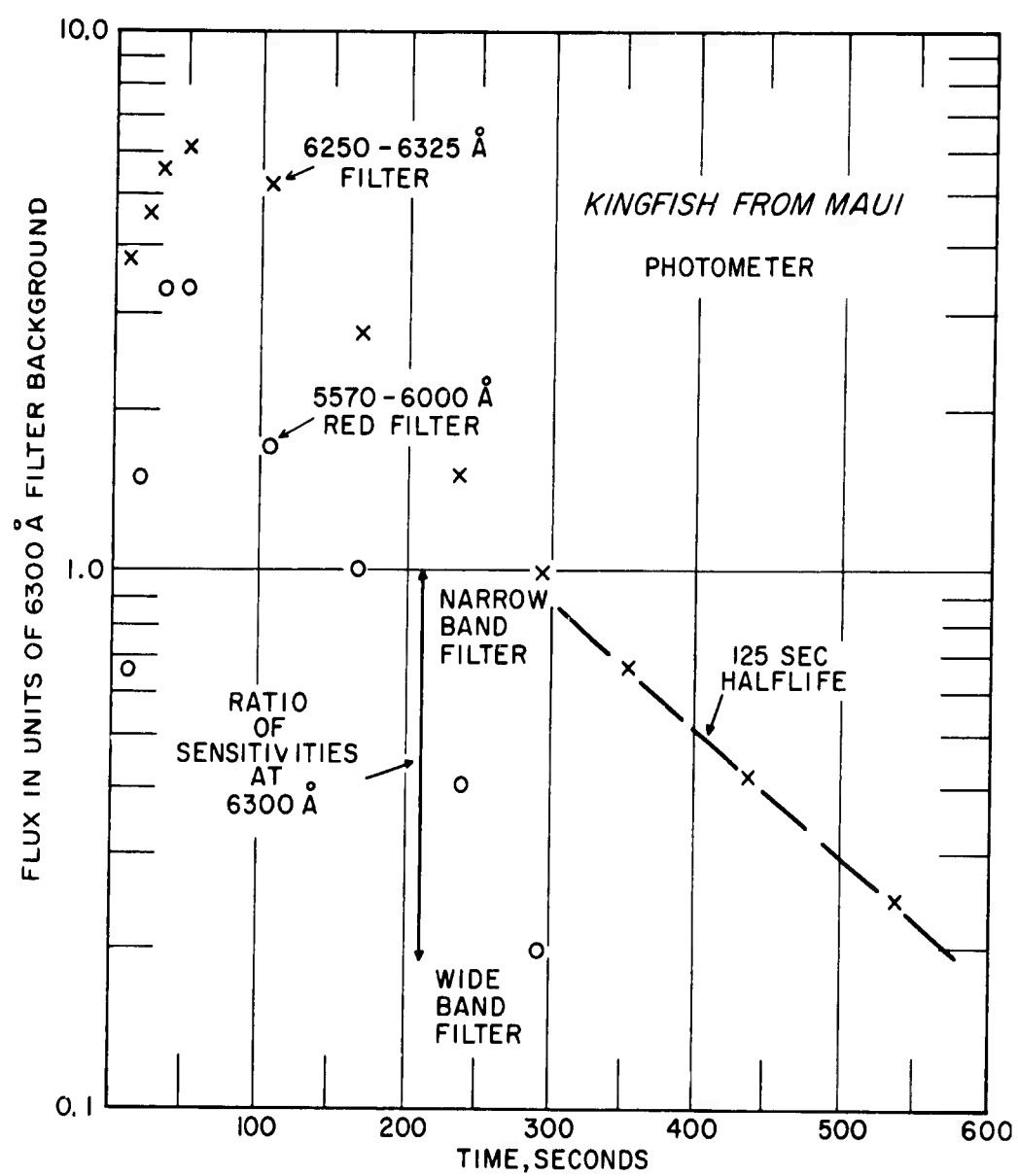


Figure 3.622 Photometer results from Maui, King Fish.

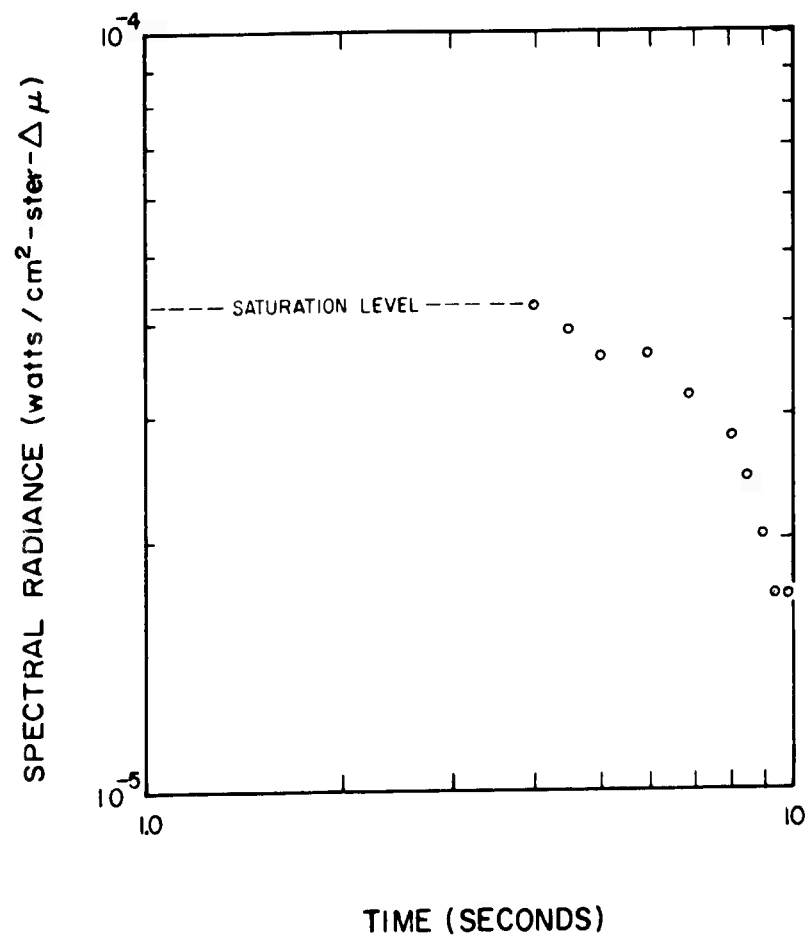


Figure 3.623 Spectral radiance, Kettle I, Tight Rope, Channel 1, early time.

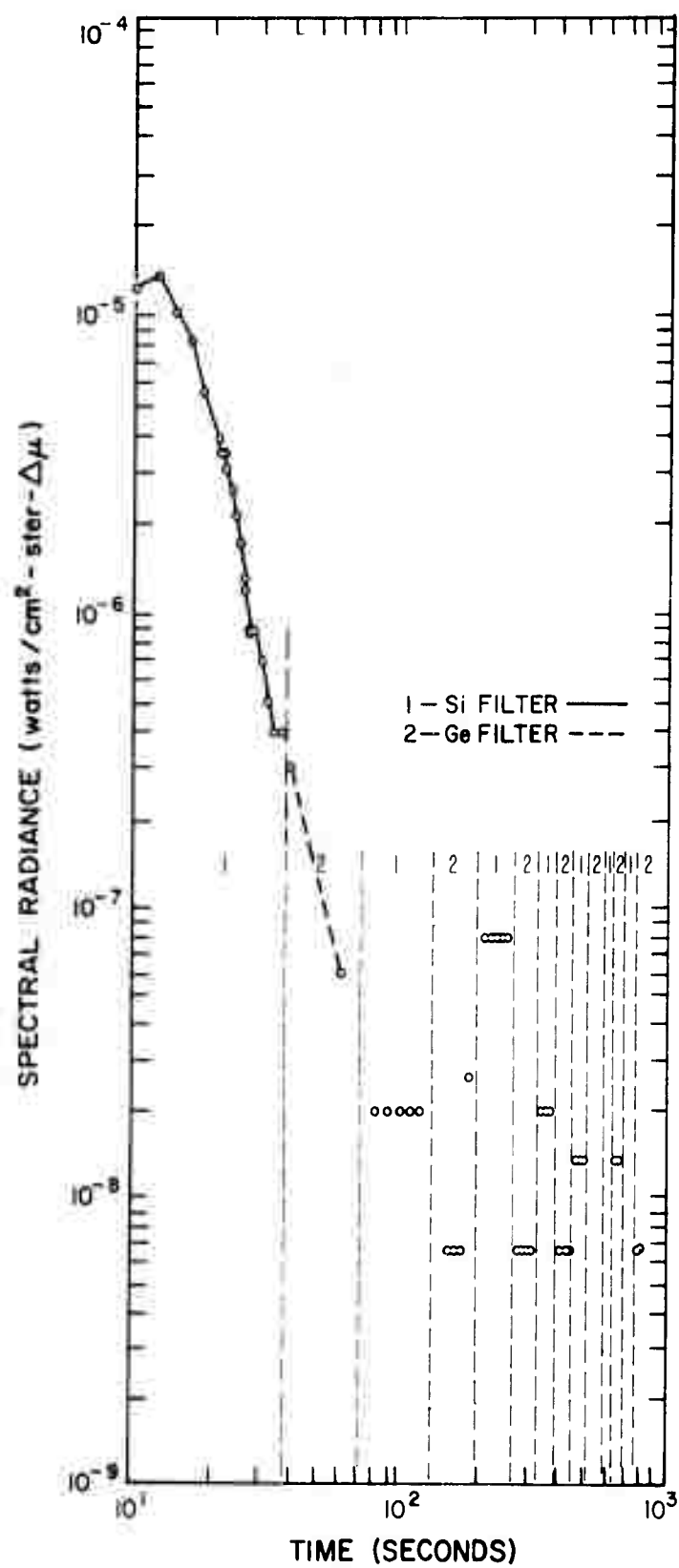


Figure 3.624 Spectral radiance, Kettle I, Tight Rope, Channel 1, late time.

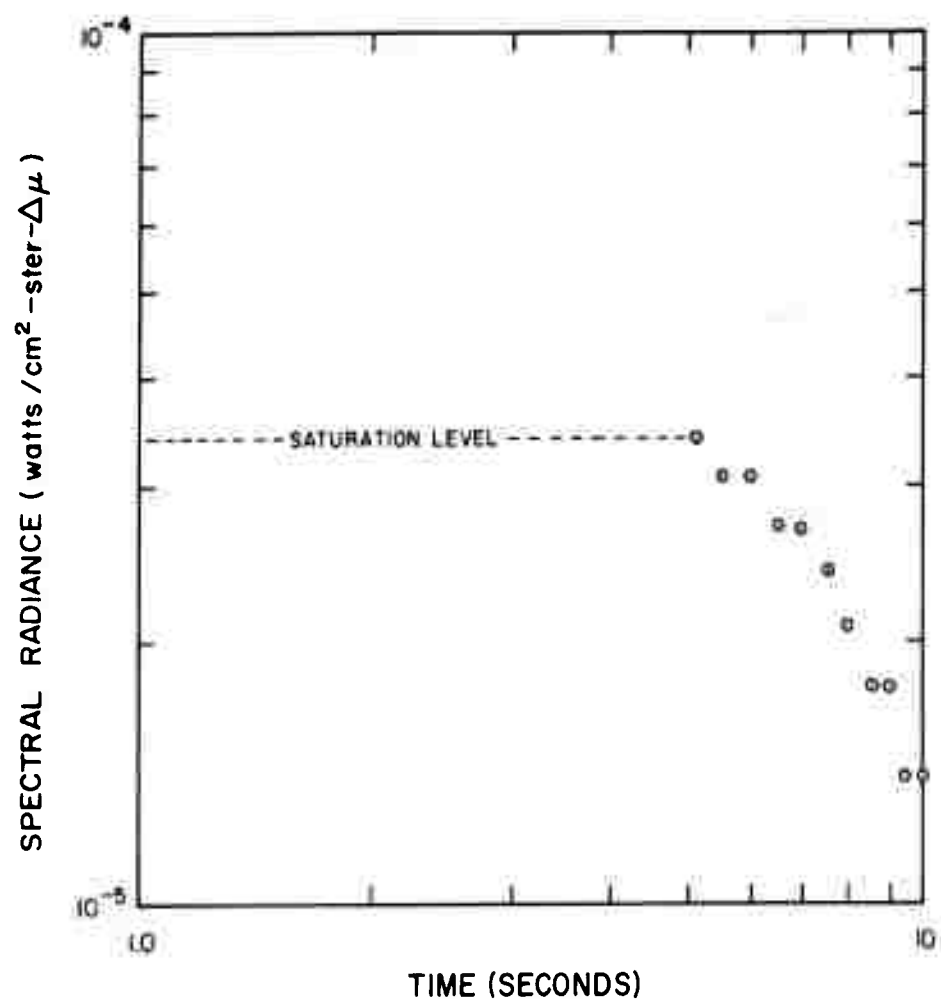


Figure 3.625 Spectral radiance, Kettle I, Tight Rope, Channel 2, early time.

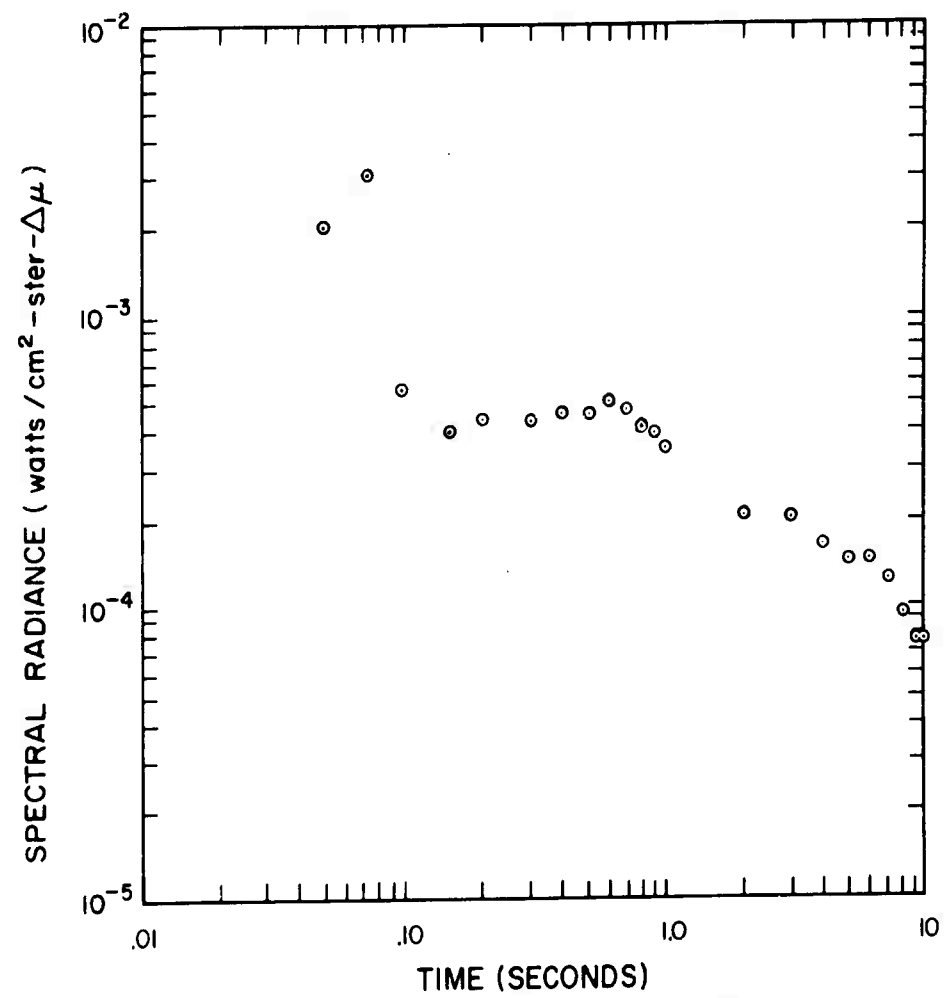
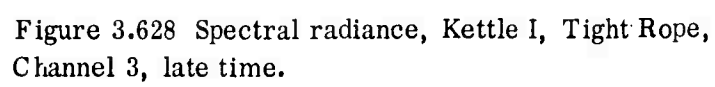


Figure 3.627 Spectral radiance, Kettle I, Tight Rope, Channel 3, early time.



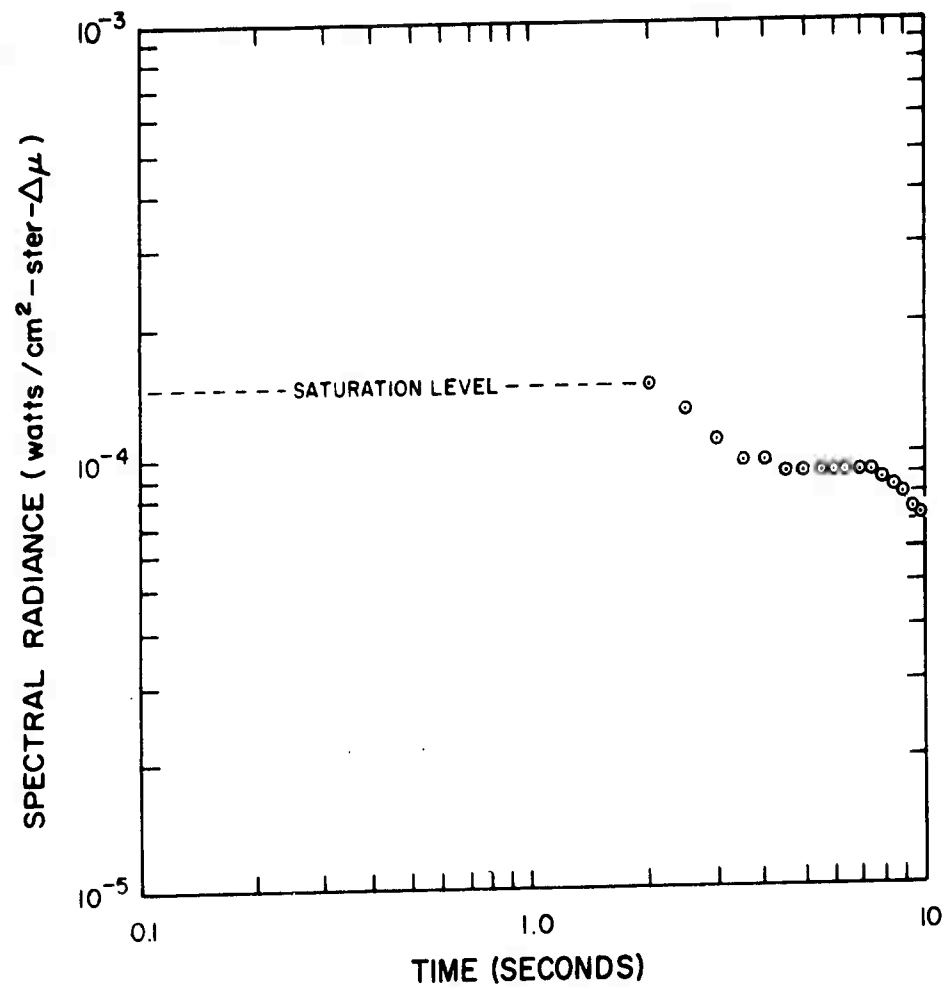


Figure 3.629 Spectral radiance, Kettle I, Tight Rope, Channel 4, early time.

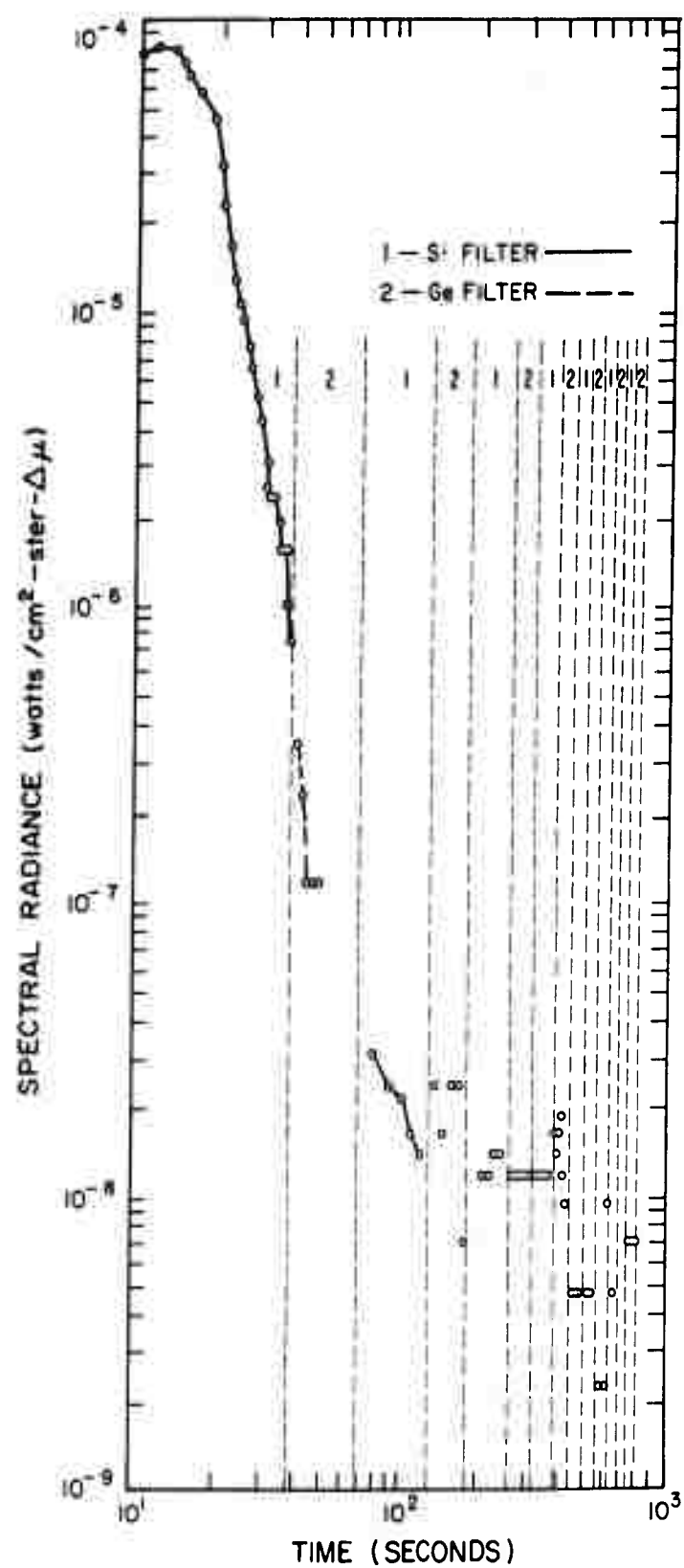


Figure 3.630 Spectral radiance, Kettle I, Tight Rope, Channel 4, late time.

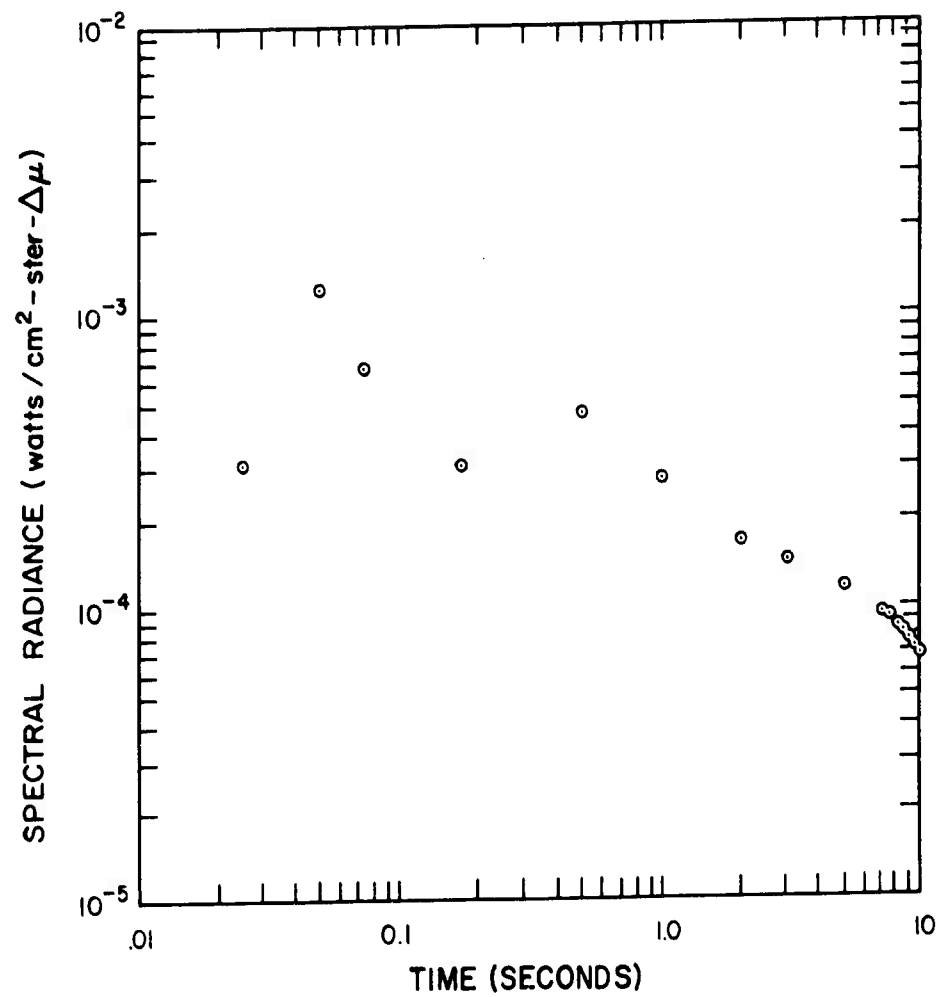


Figure 3.631 Spectral radiance, Kettle I, Tight Rope, Channel 5, early time.

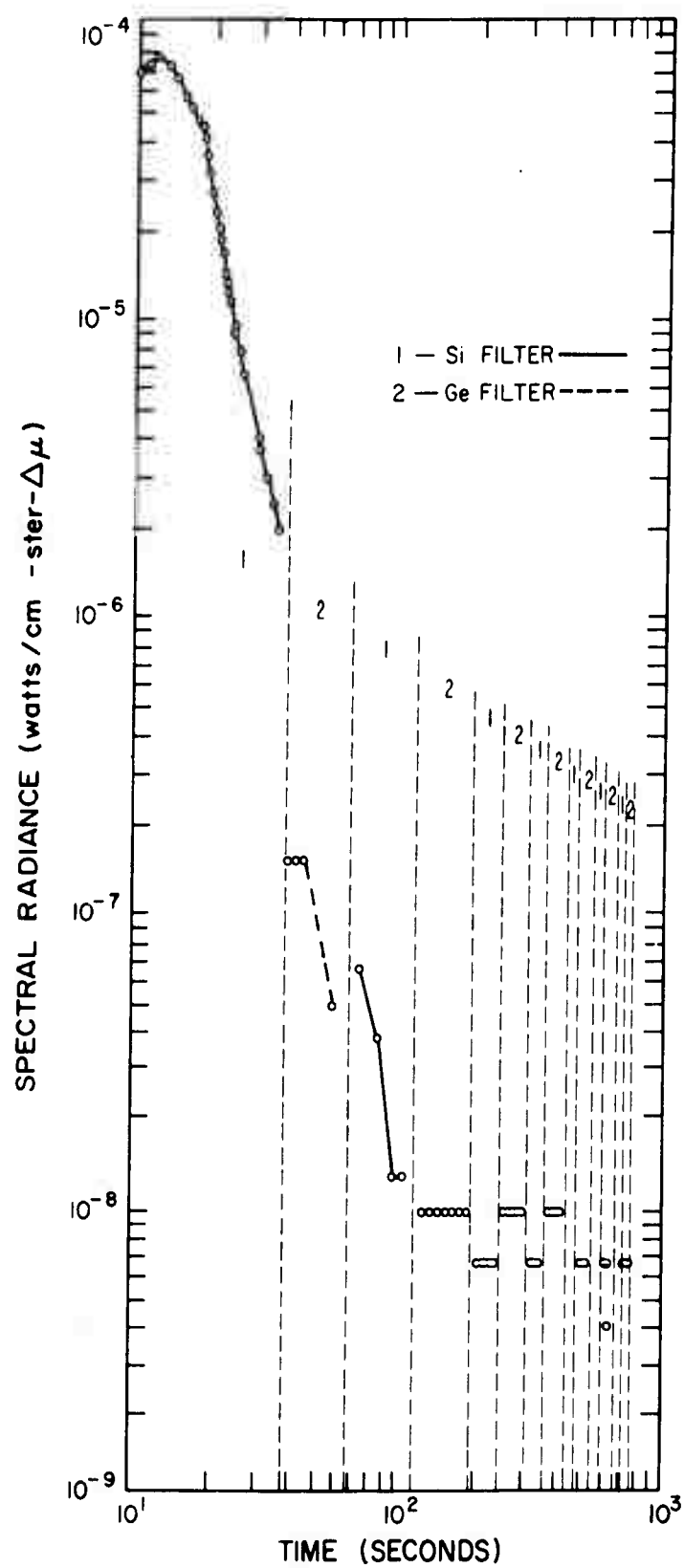


Figure 3.632 Spectral radiance, Kettle I, Tight Rope, Channel 5, late time.

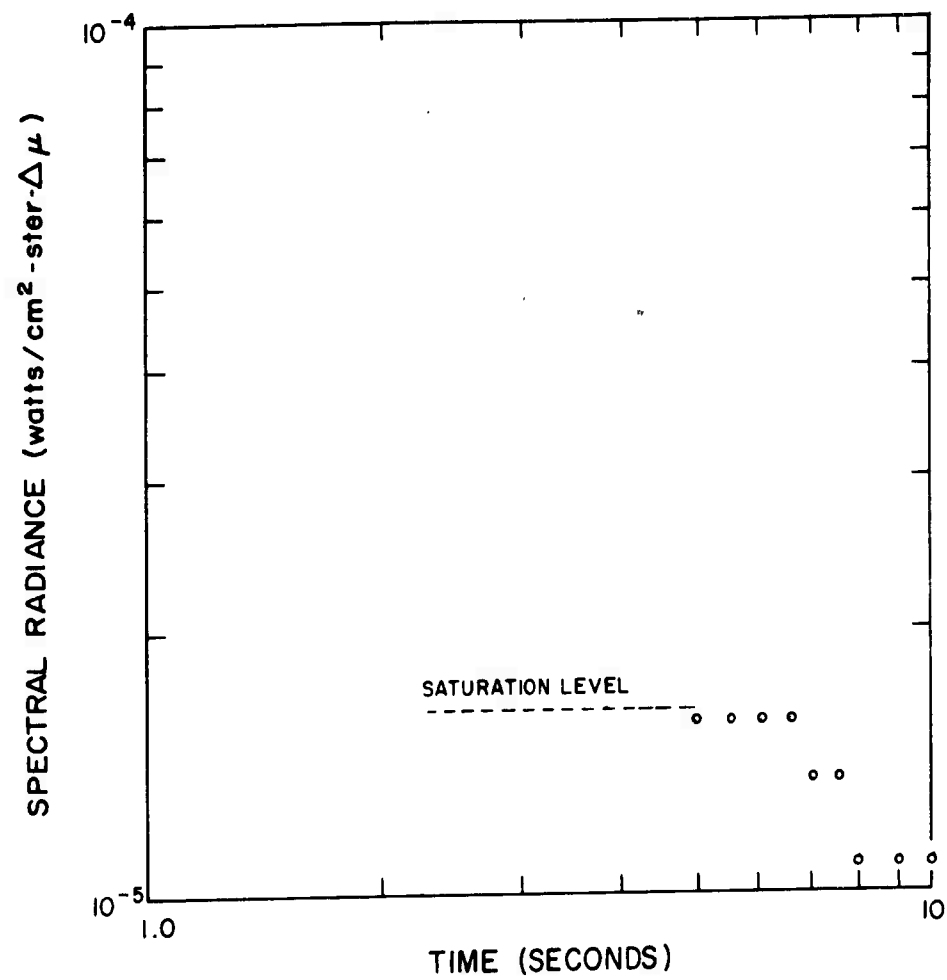


Figure 3.633 Spectral radiance, Kettle I, Tight Rope, Channel 6, early time.

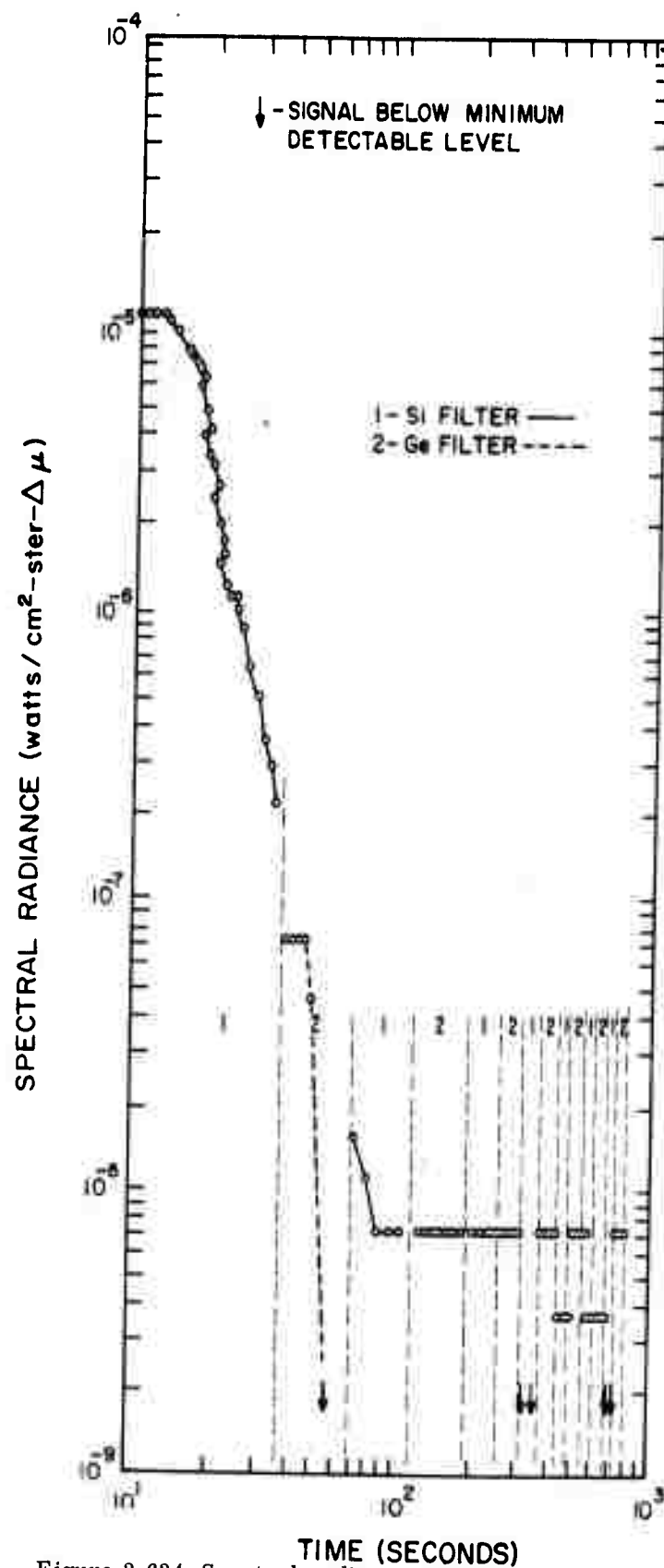


Figure 3.634 Spectral radiance, Kettle I, Tight Rope, Channel 6, late time. 311

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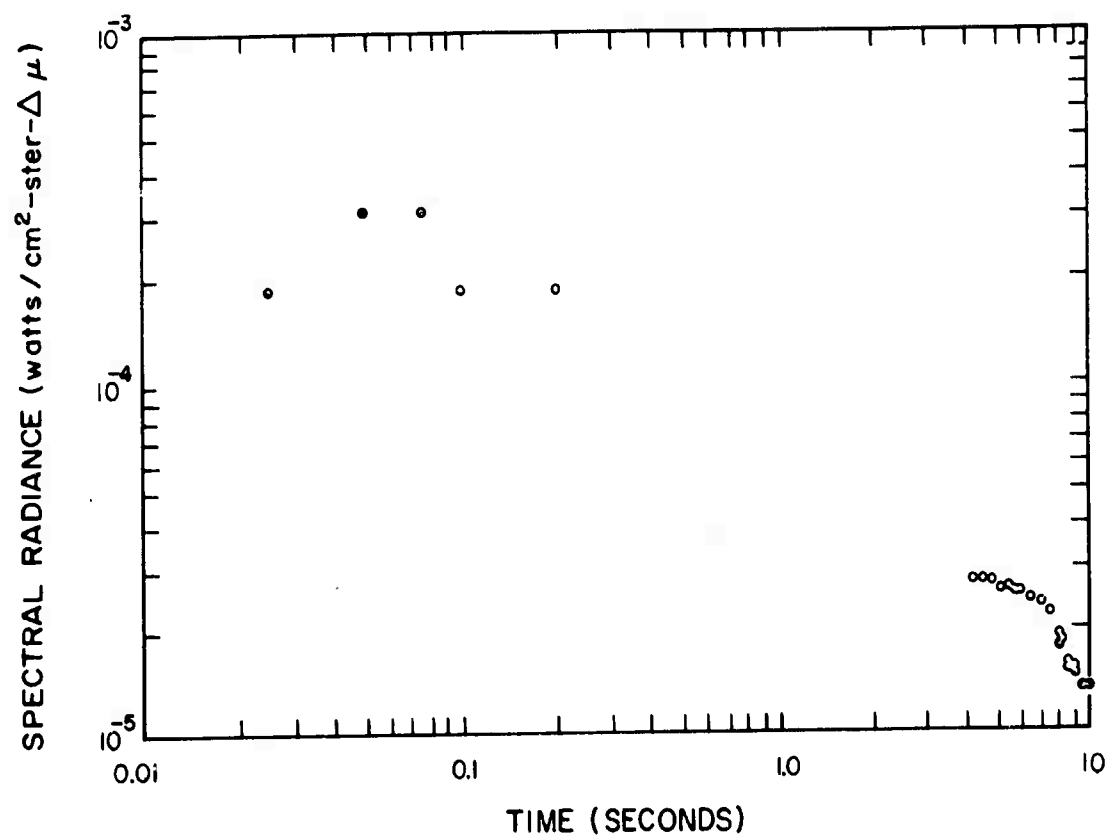


Figure 3.635 Spectral radiance, Kettle I, Tight Rope, Channel 7, early time.

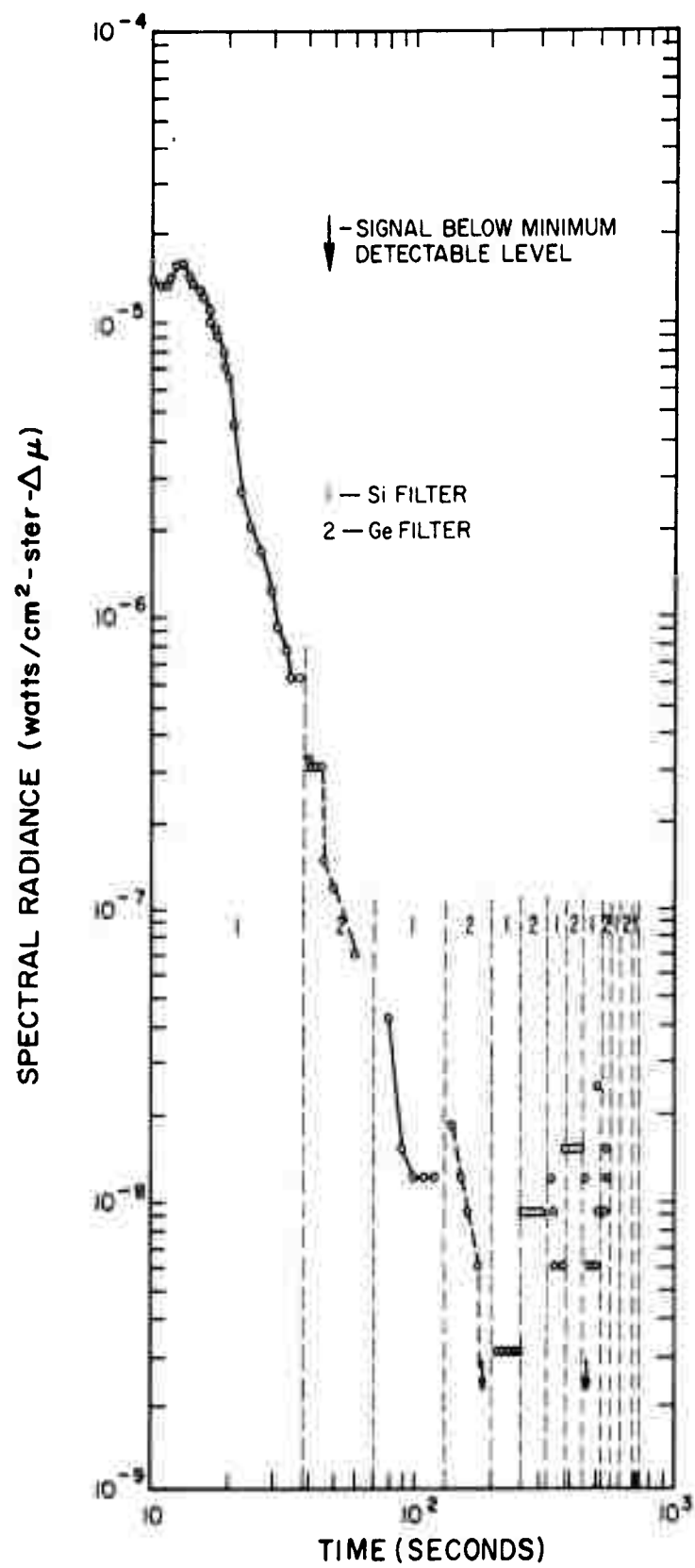


Figure 3.636 Spectral radiance, Kettle I, Tight Rope, Channel 7, late time.

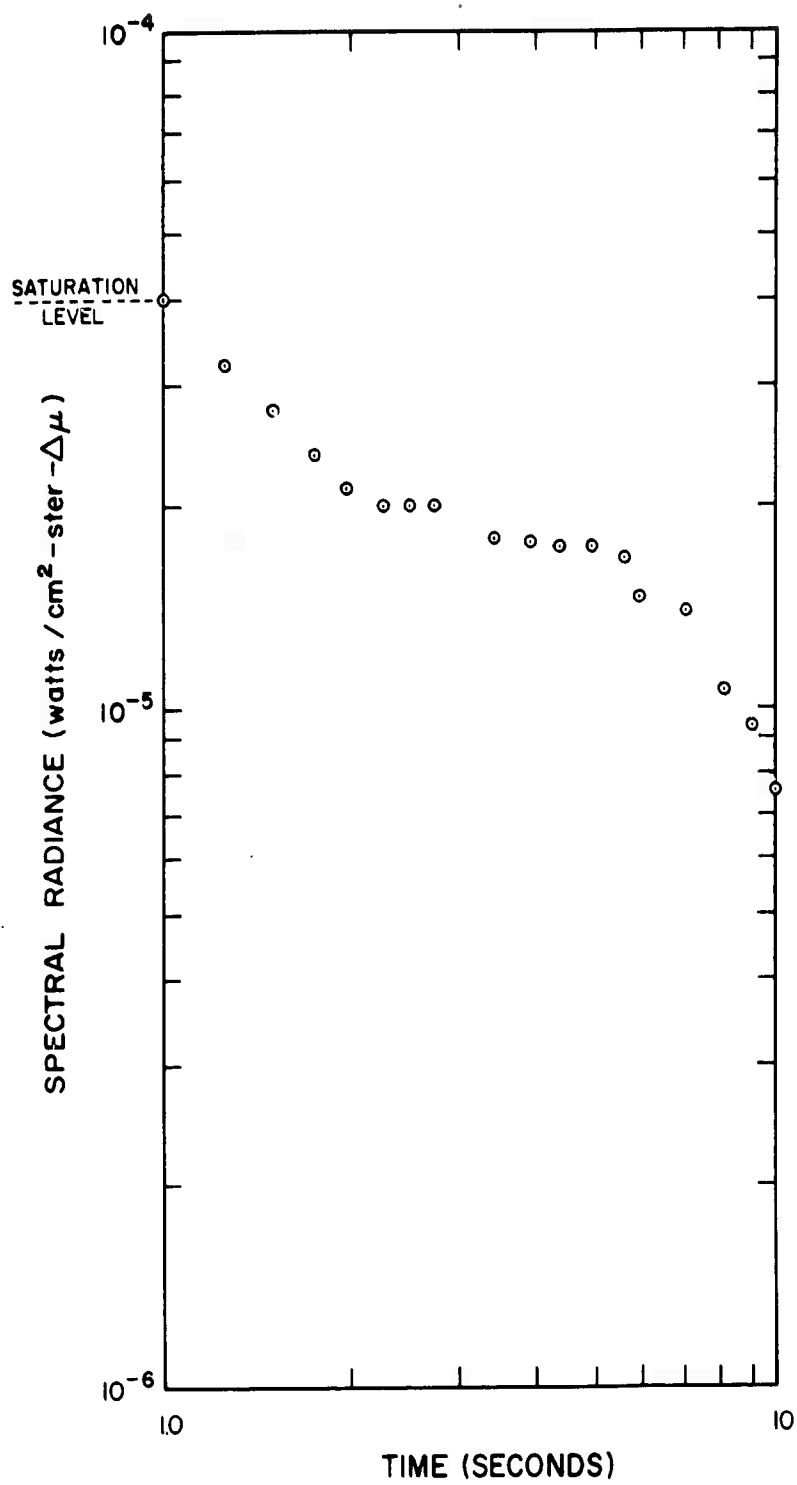


Figure 3.637 Spectral radiance, Kettle I, Tight Rope, Channel 8, early time.

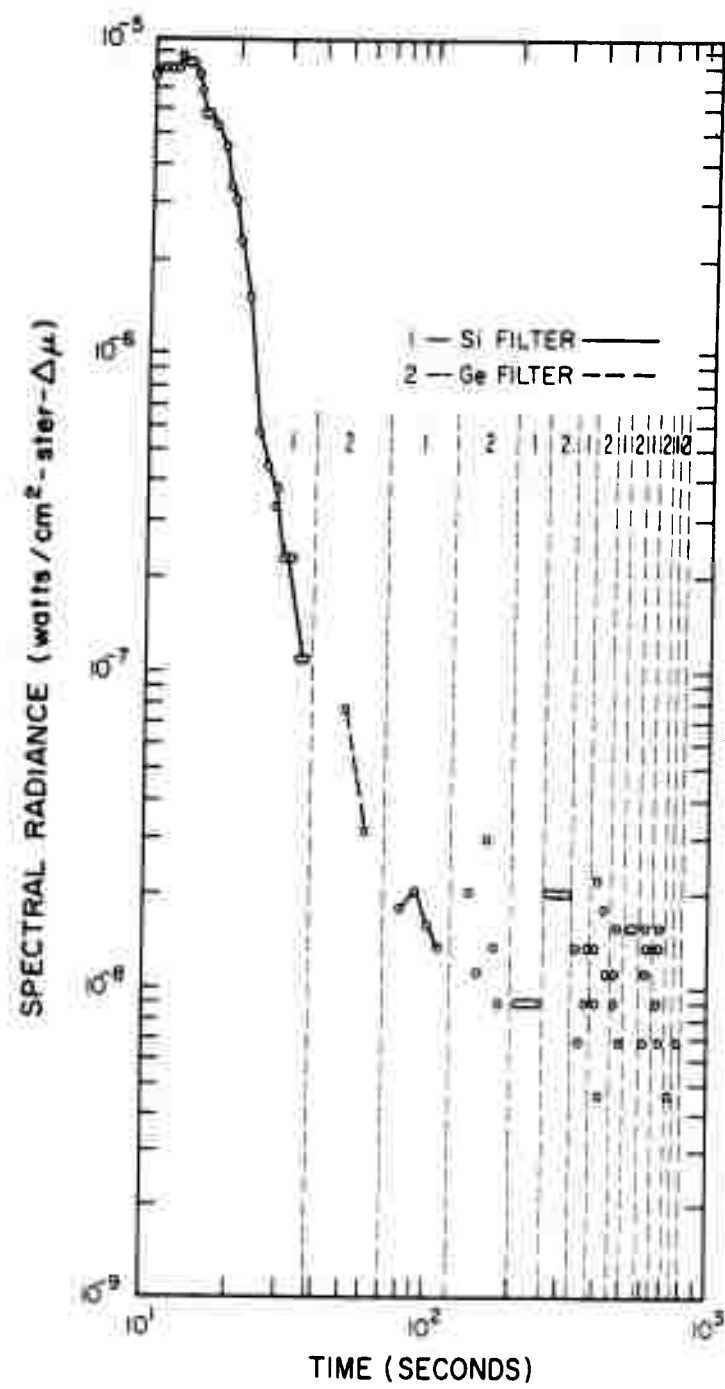


Figure 3.638 Spectral radiance, Kettle I, Tight Rope, Channel 8, late time.

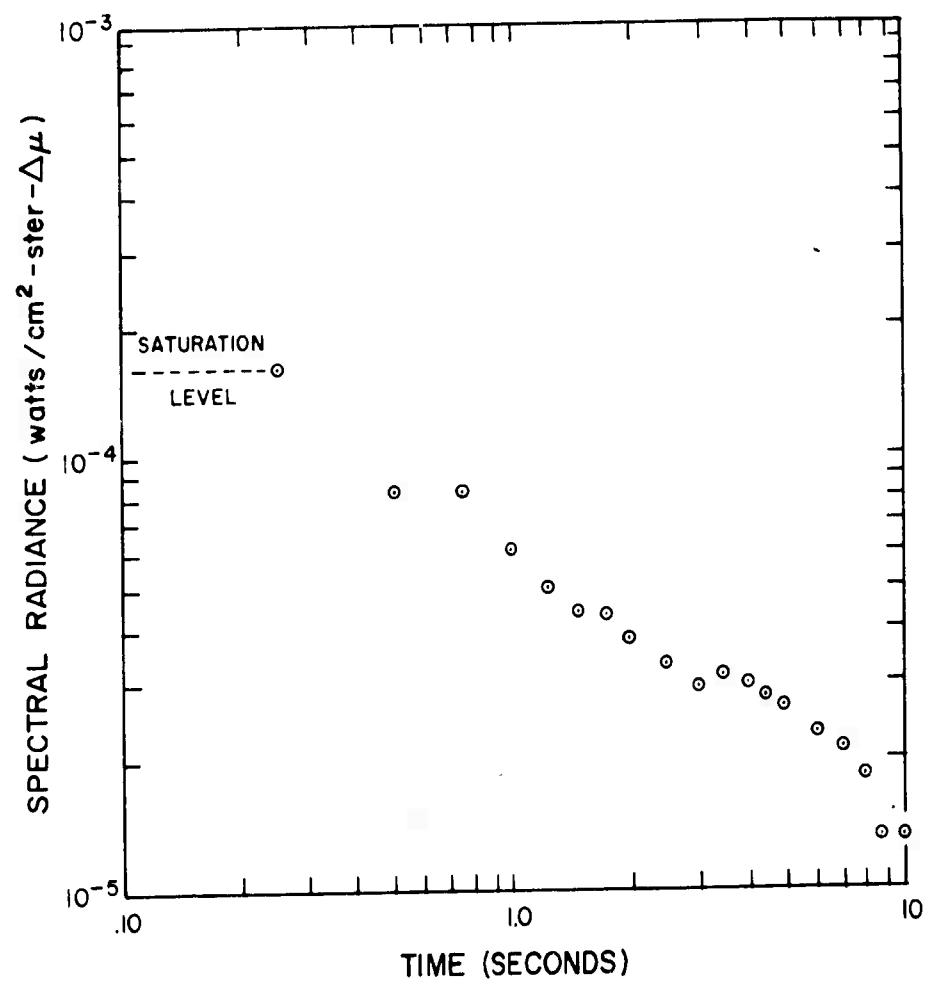


Figure 3.639 Spectral radiance, Kettle I, Tight Rope, Channel 9, early time.

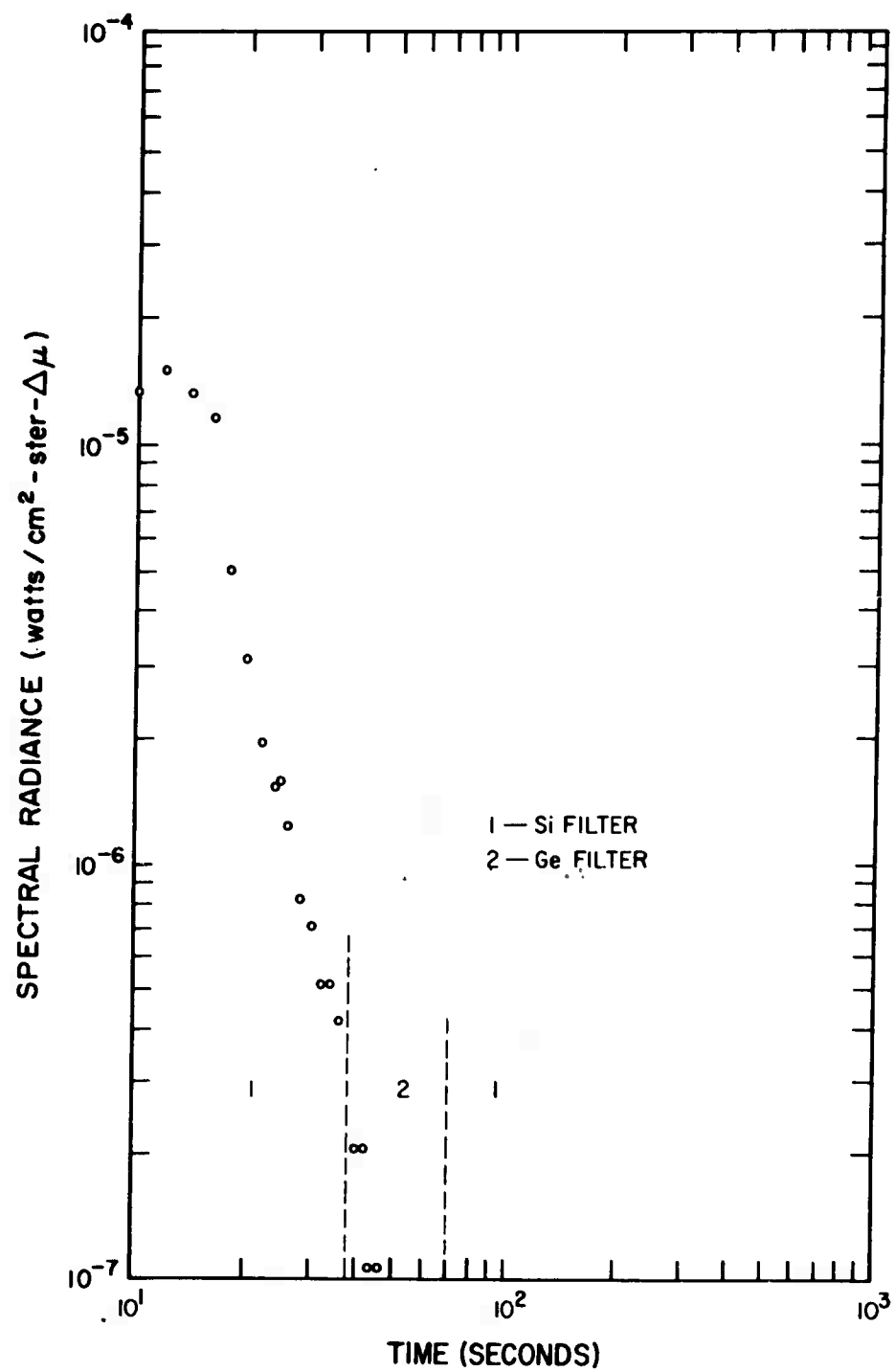


Figure 3.640 Spectral radiance, Kettle I, Tight Rope, Channel 9, late time.

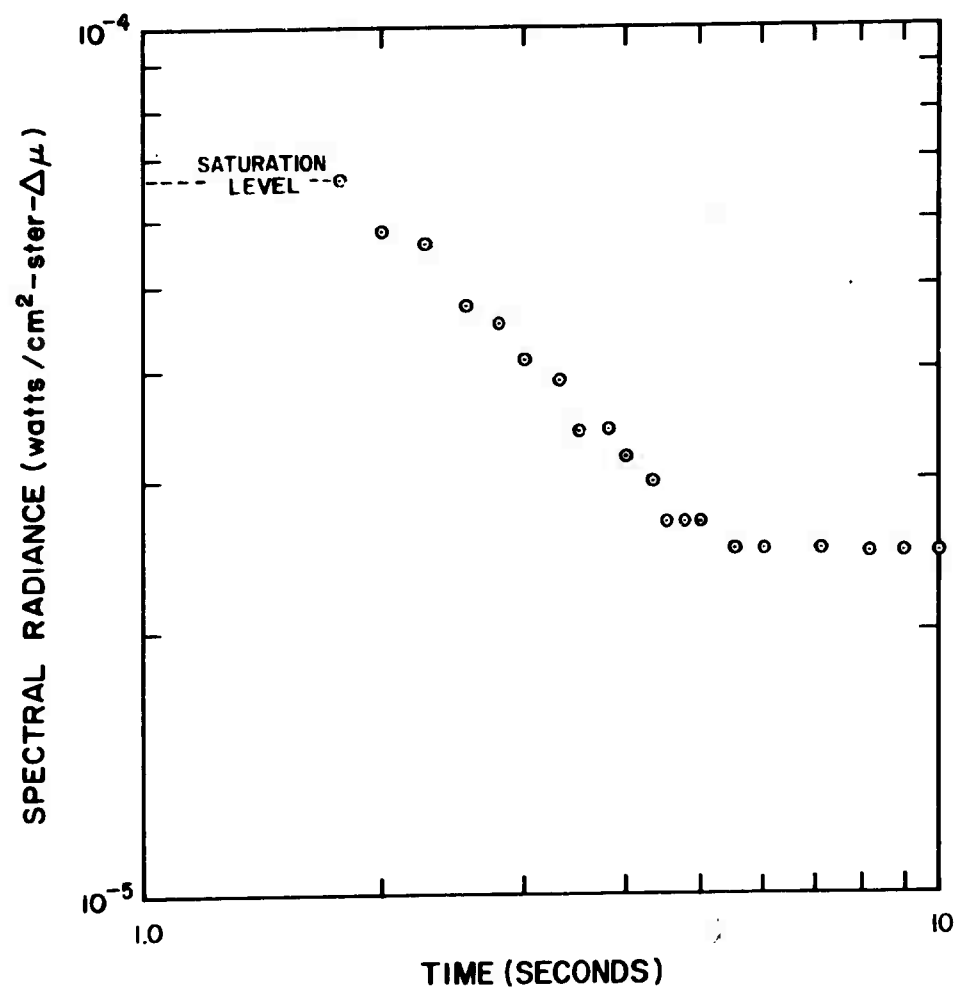


Figure 3.641 Spectral radiance, Kettle I, Tight Rope, Channel 14, early time.

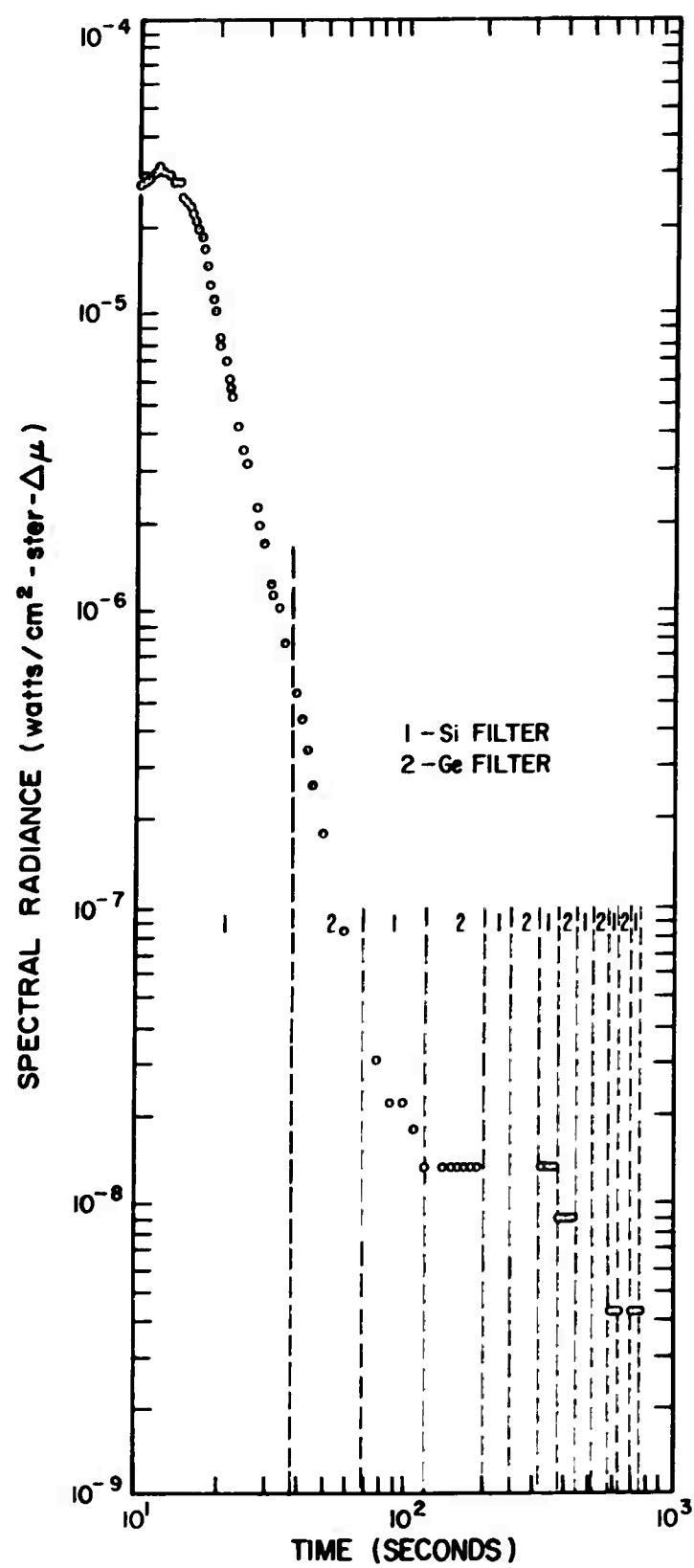


Figure 3.642 Spectral radiance, Kettle I, Tight Rope, Channel 14, late time.

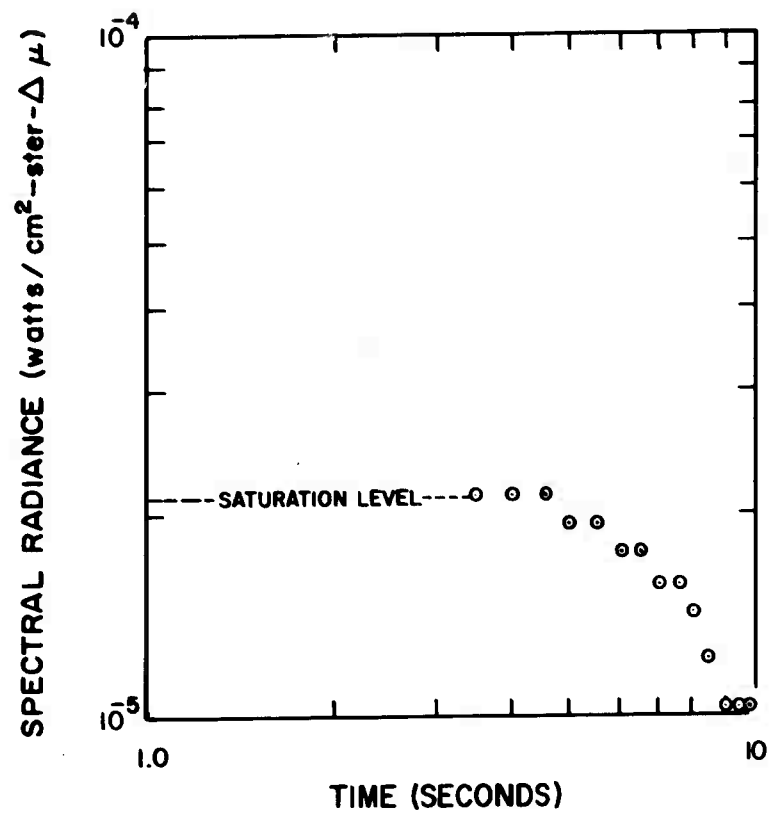


Figure 3.643 Spectral radiance, Kettle I, Tight Rope, Channel 15, early time.

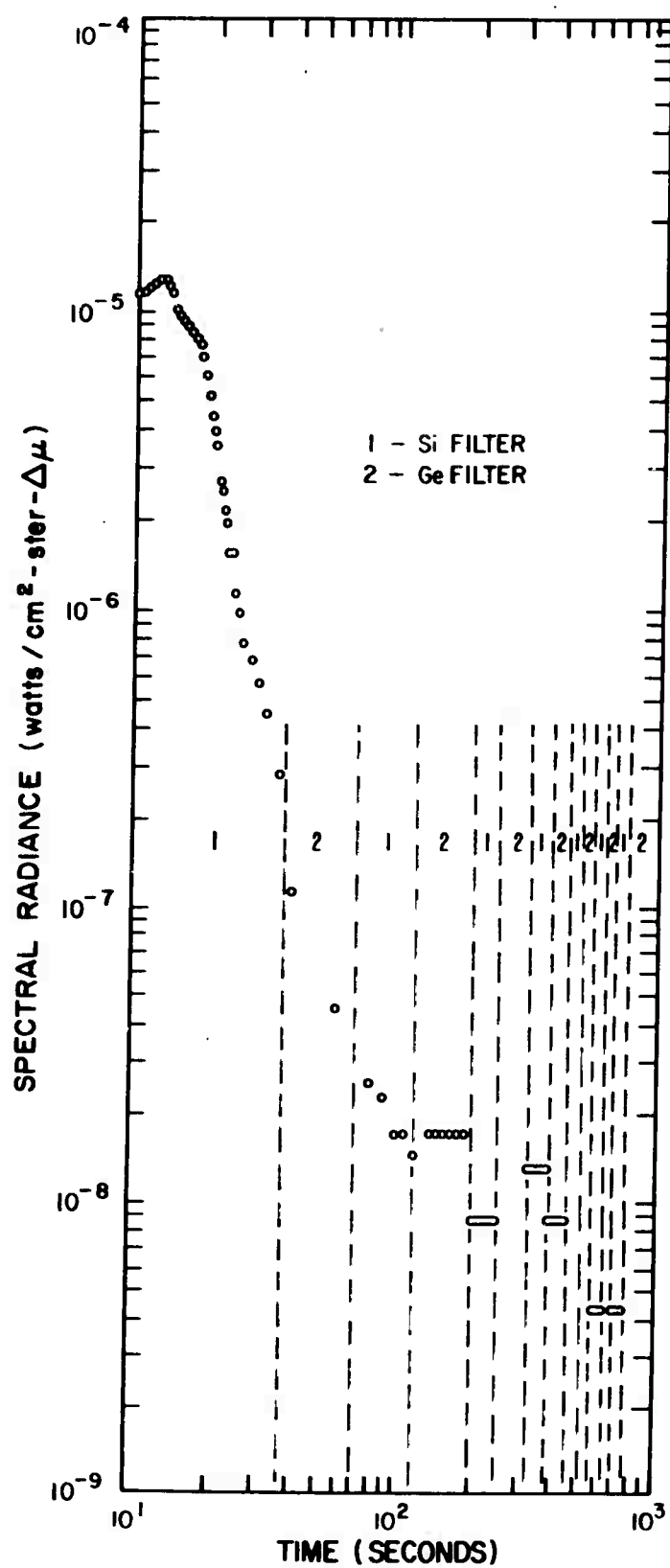


Figure 3.644 Spectral radiance, Kettle I, Tight Rope, Channel 15, late time.

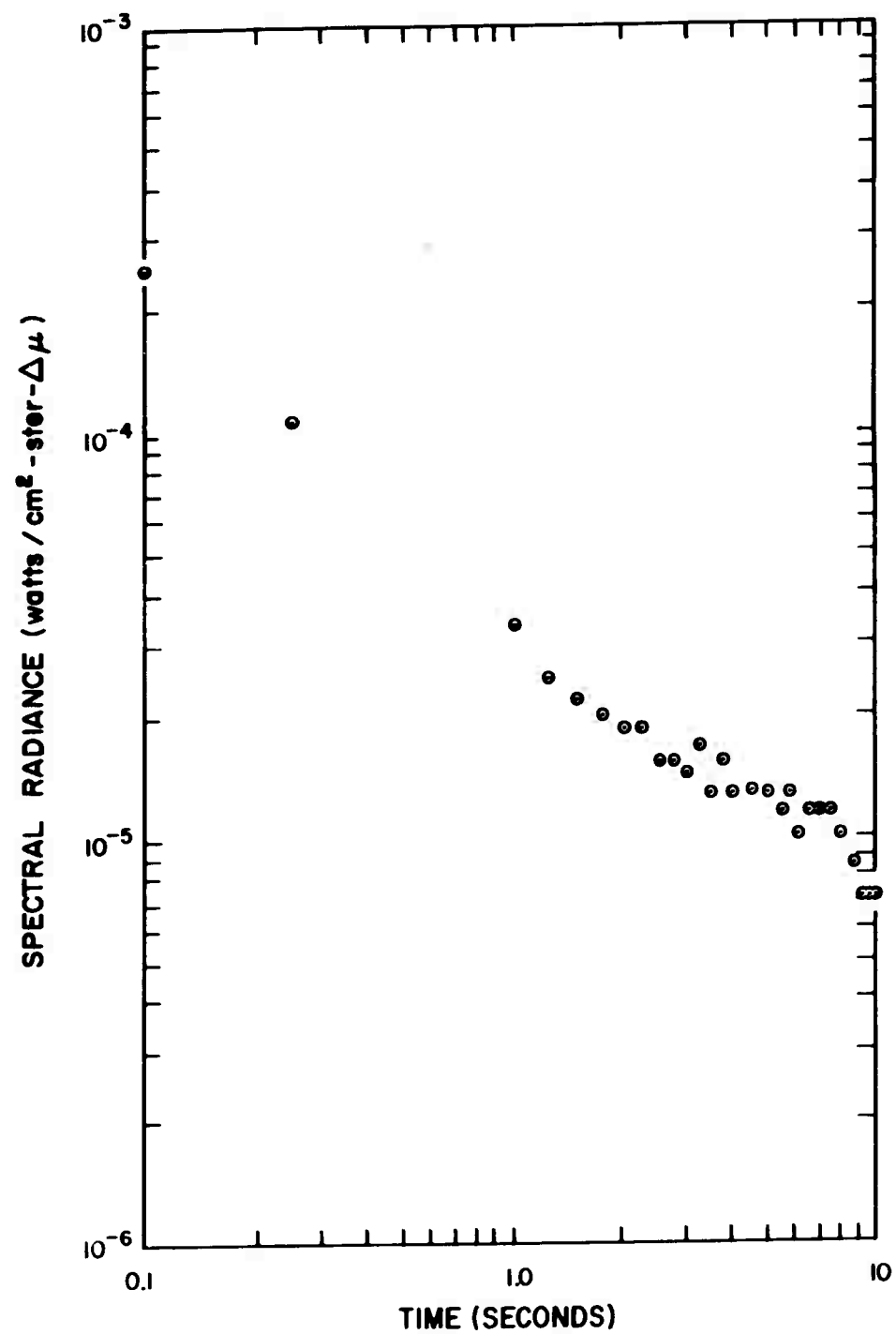


Figure 3.645 Spectral radiance, Kettle I, Tight Rope, Channel 16, early time.

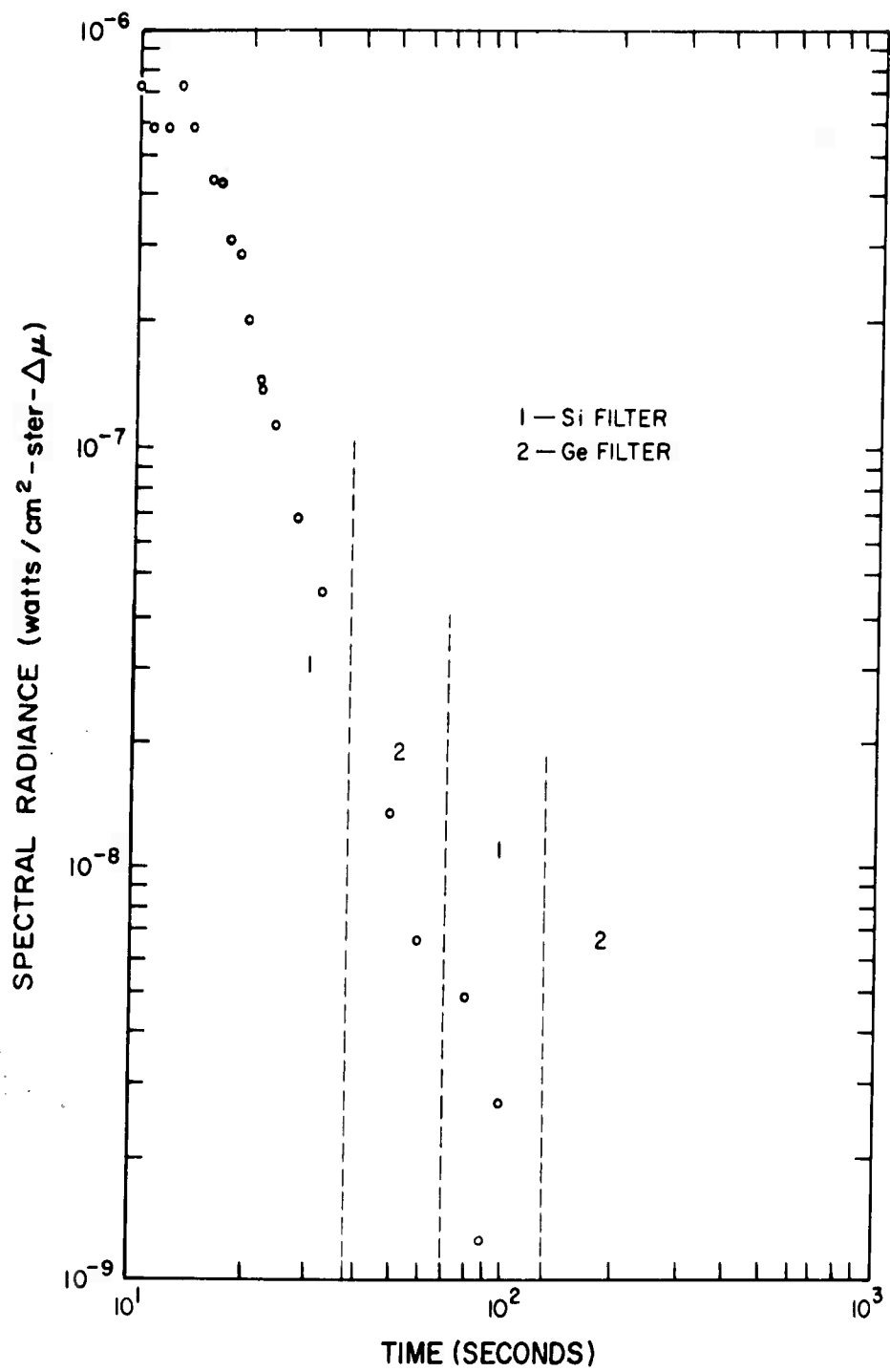


Figure 3.646 Spectral radiance, Kettle I, Tight Rope, Channel 16, late time.

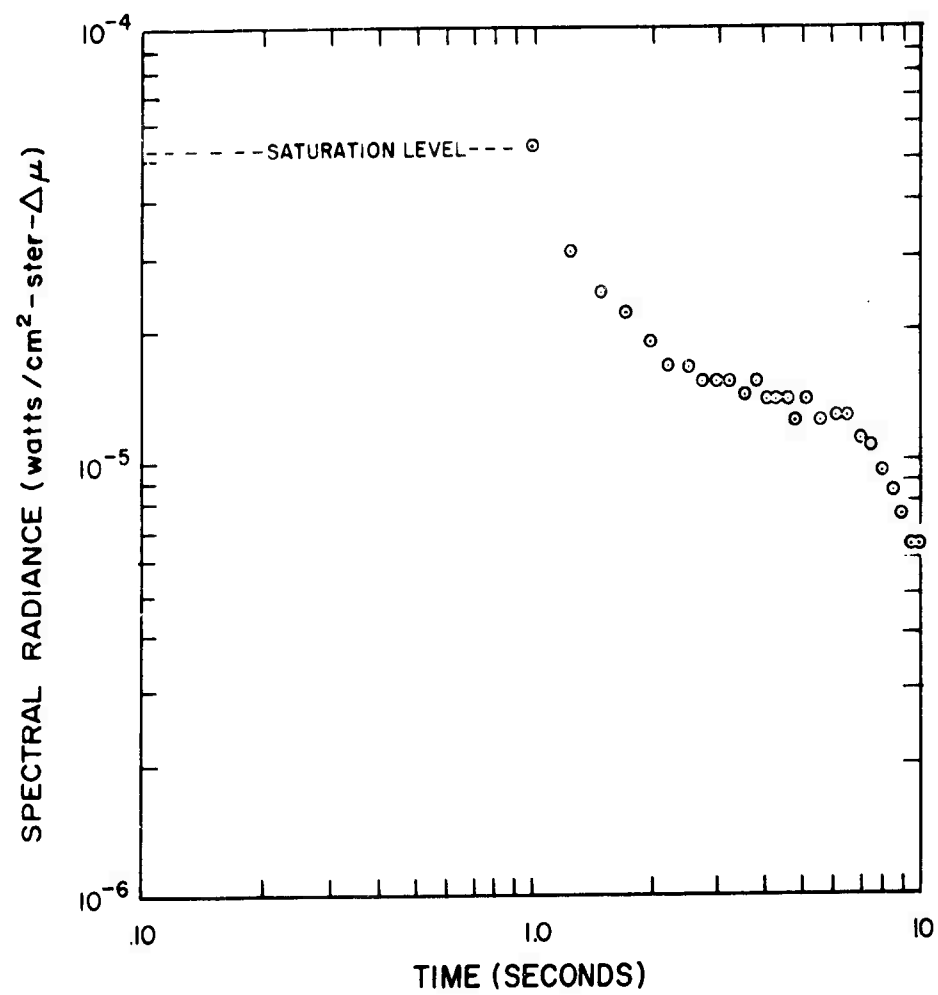


Figure 3.647 Spectral radiance, Kettle I, Tight Rope, Channel 17, early time.

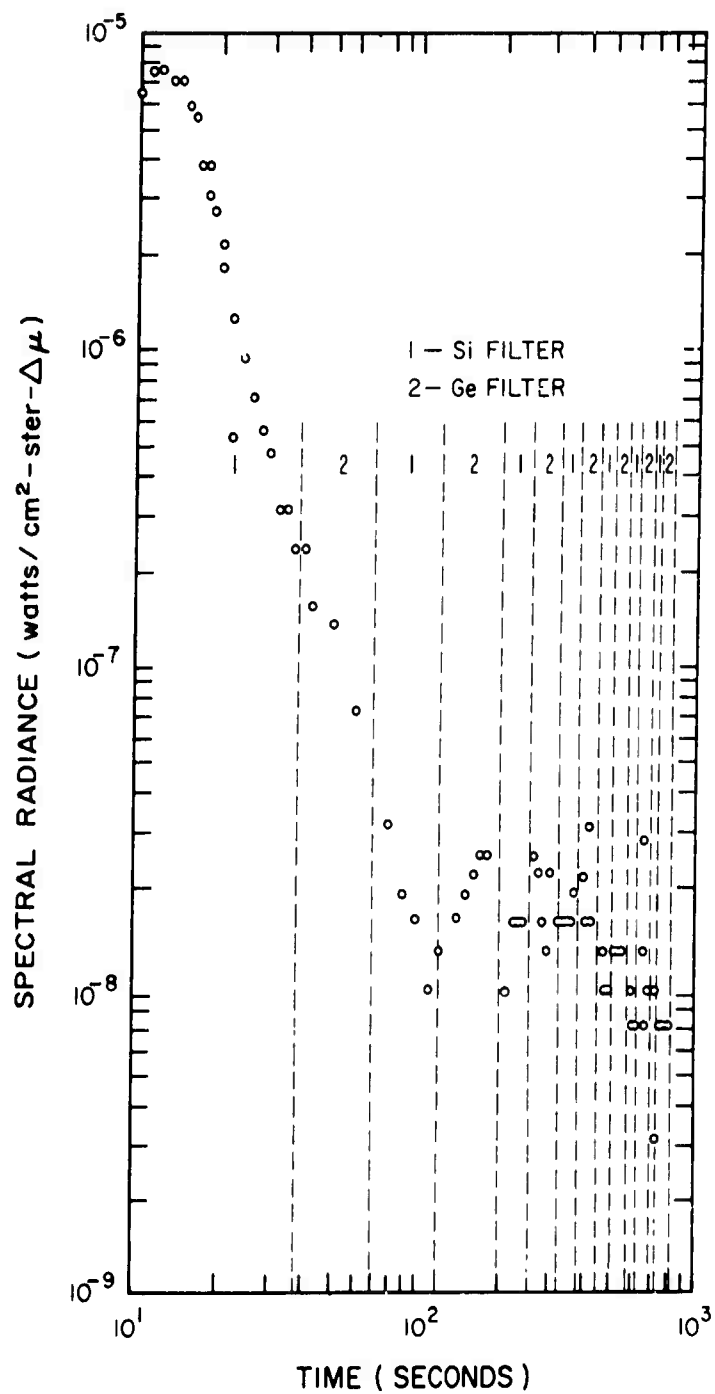


Figure 3.648 Spectral radiance, Kettle I, Tight Rope, Channel 17, late time.

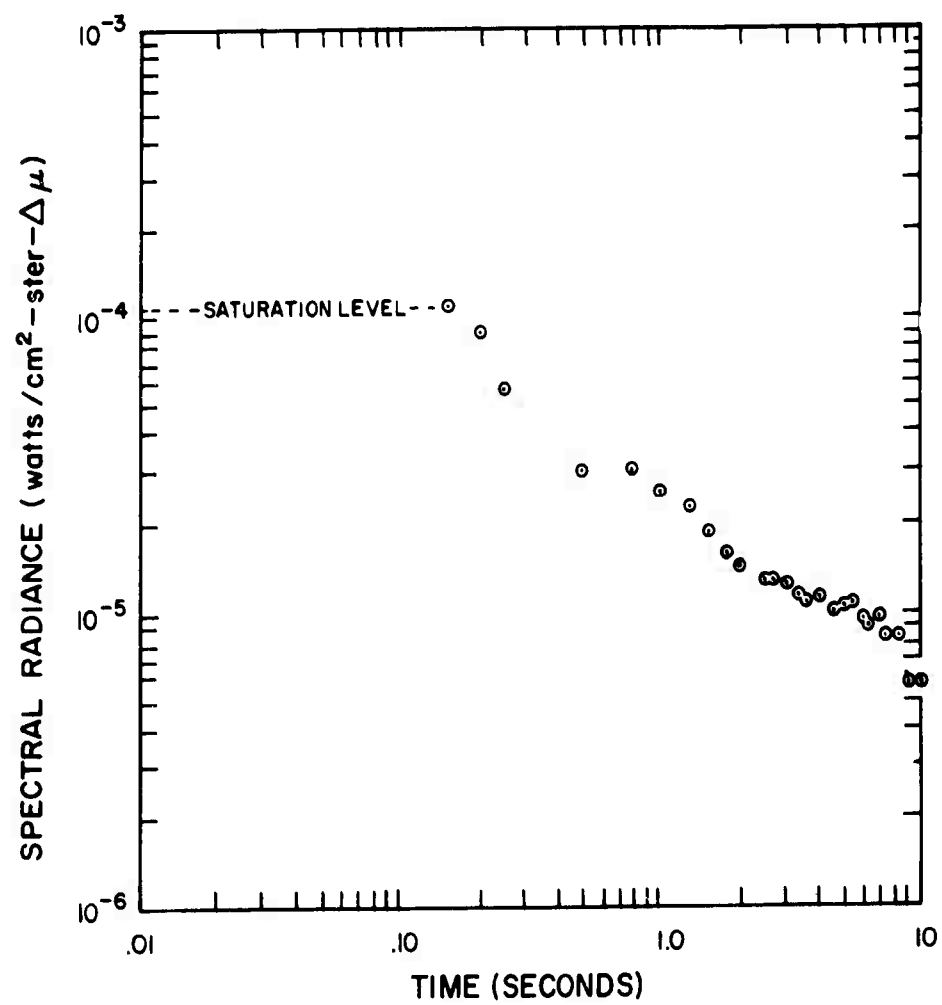


Figure 3.649 Spectral radiance, Kettle I, Tight-Rope, Channel 18, early time.

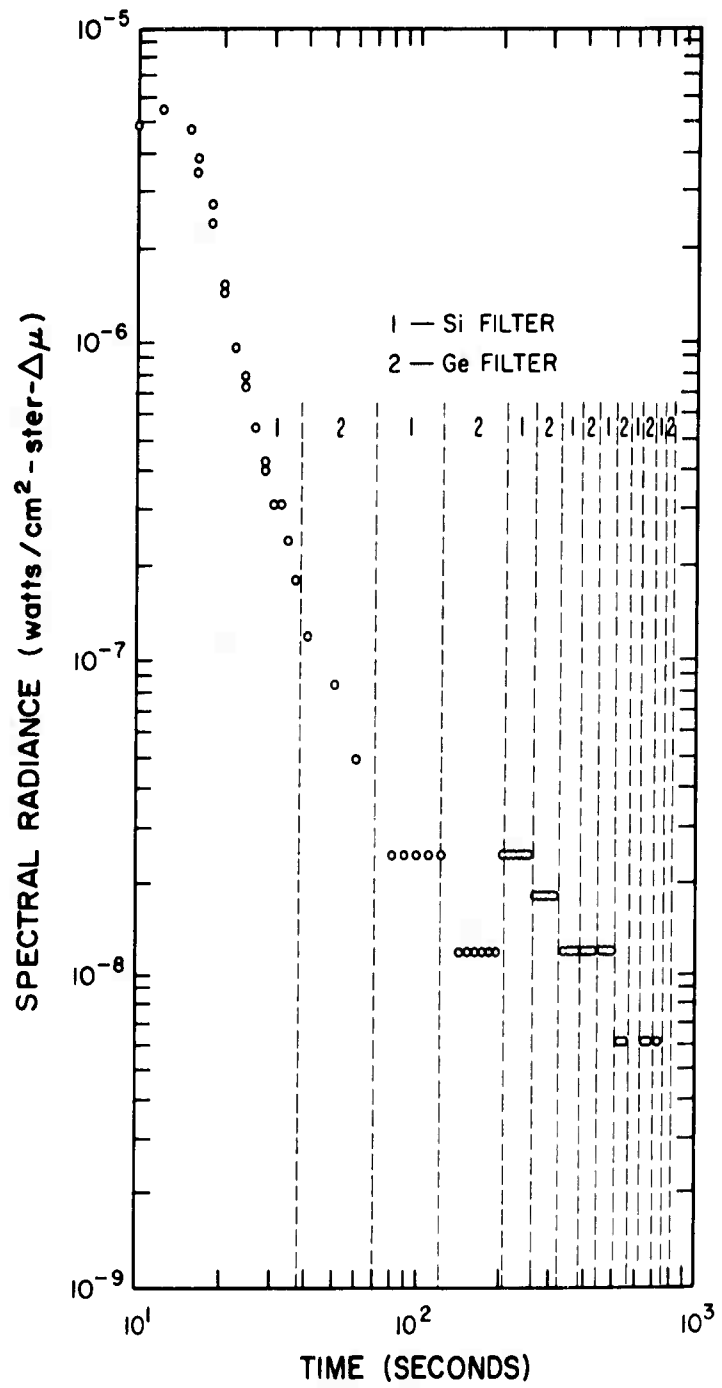


Figure 3.650 Spectral radiance, Kettle I, Tight Rope, Channel 18, late time.

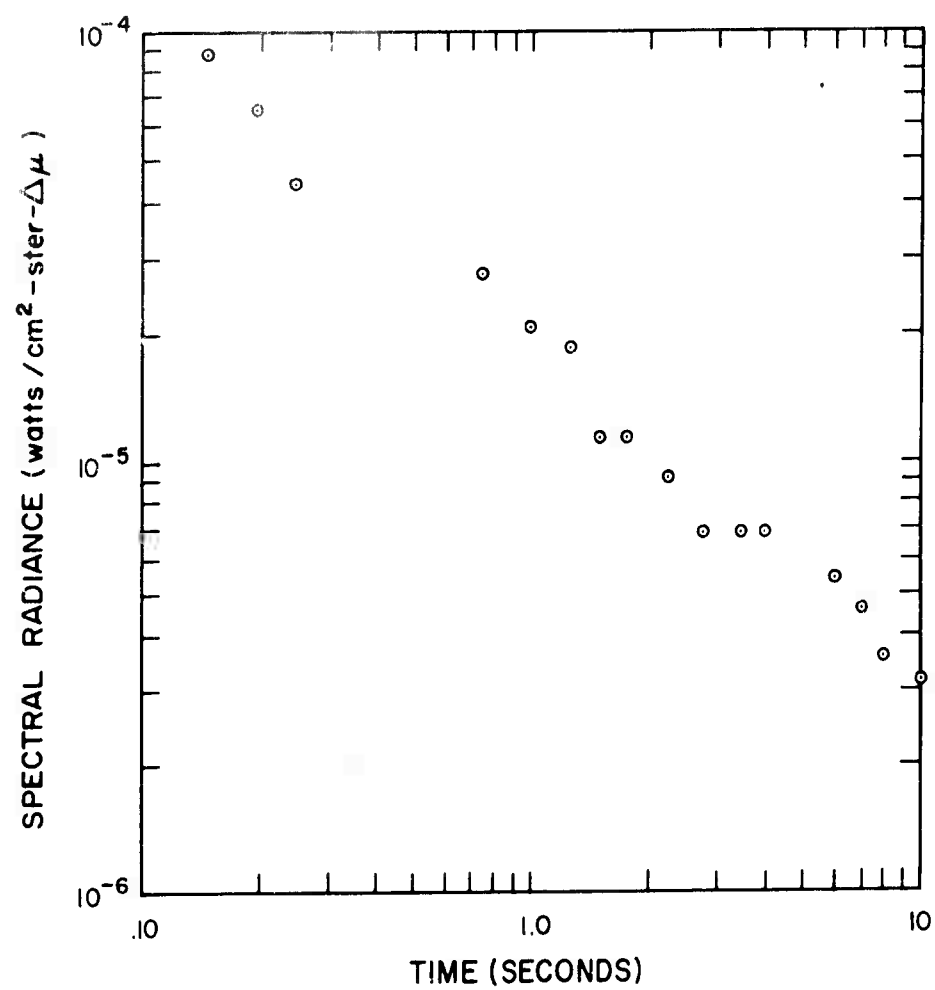


Figure 3.651 Spectral radiance, Kettle I, Tight Rope, Channel 19, early time.

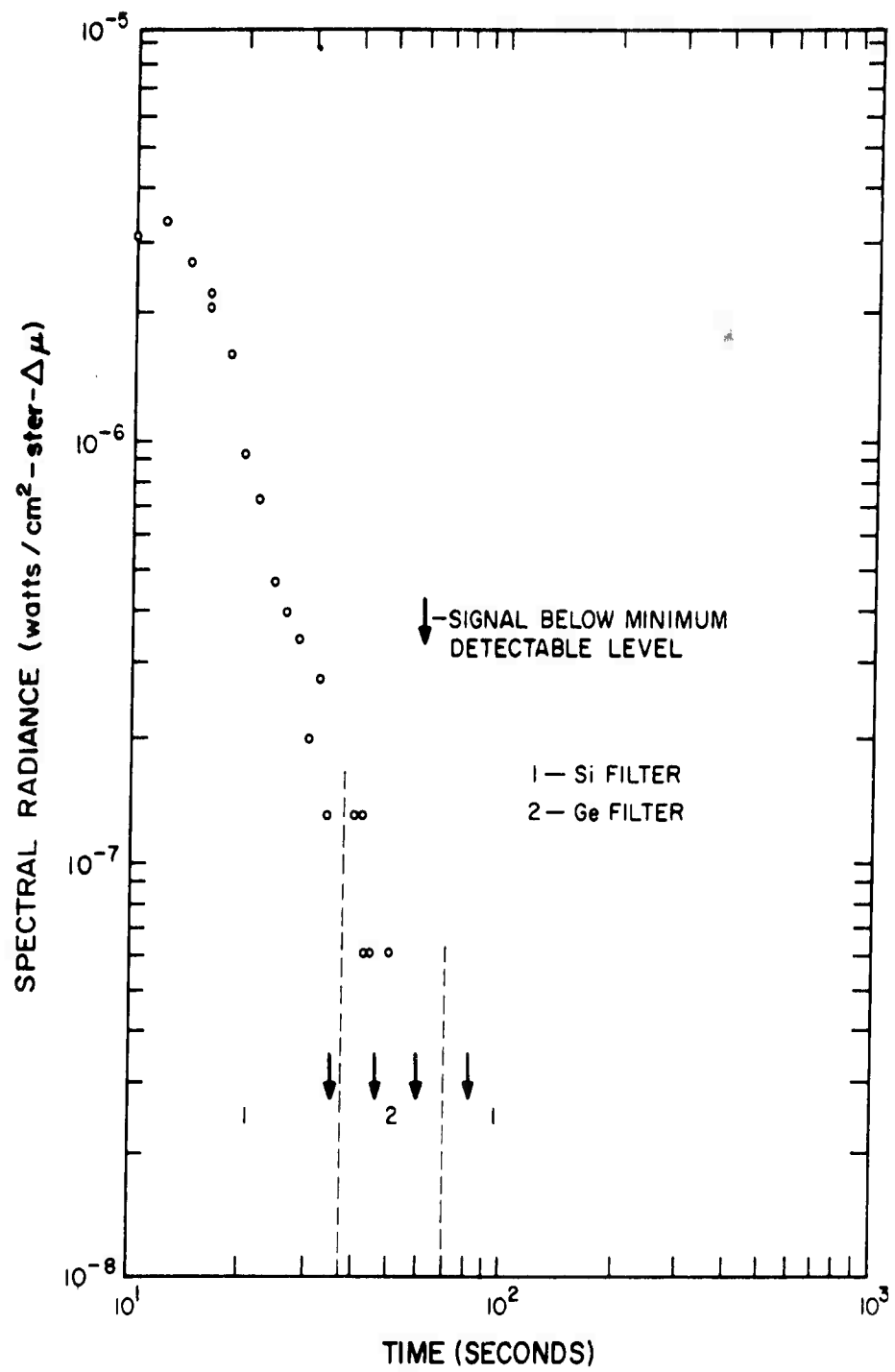


Figure 3.652 Spectral radiance, Kettle I, Tight Rope, Channel 19, late time.

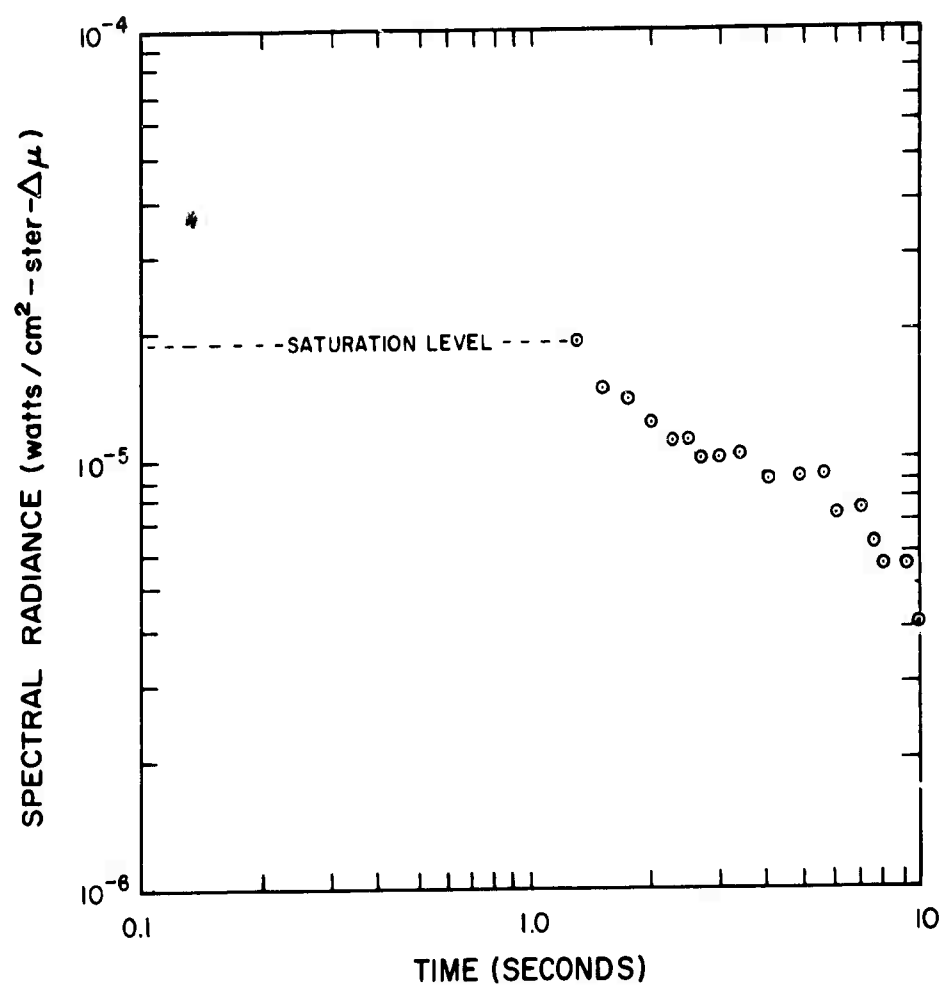


Figure 3.653 Spectral radiance, Kettle I, Tight Rope, Channel 20, early time.

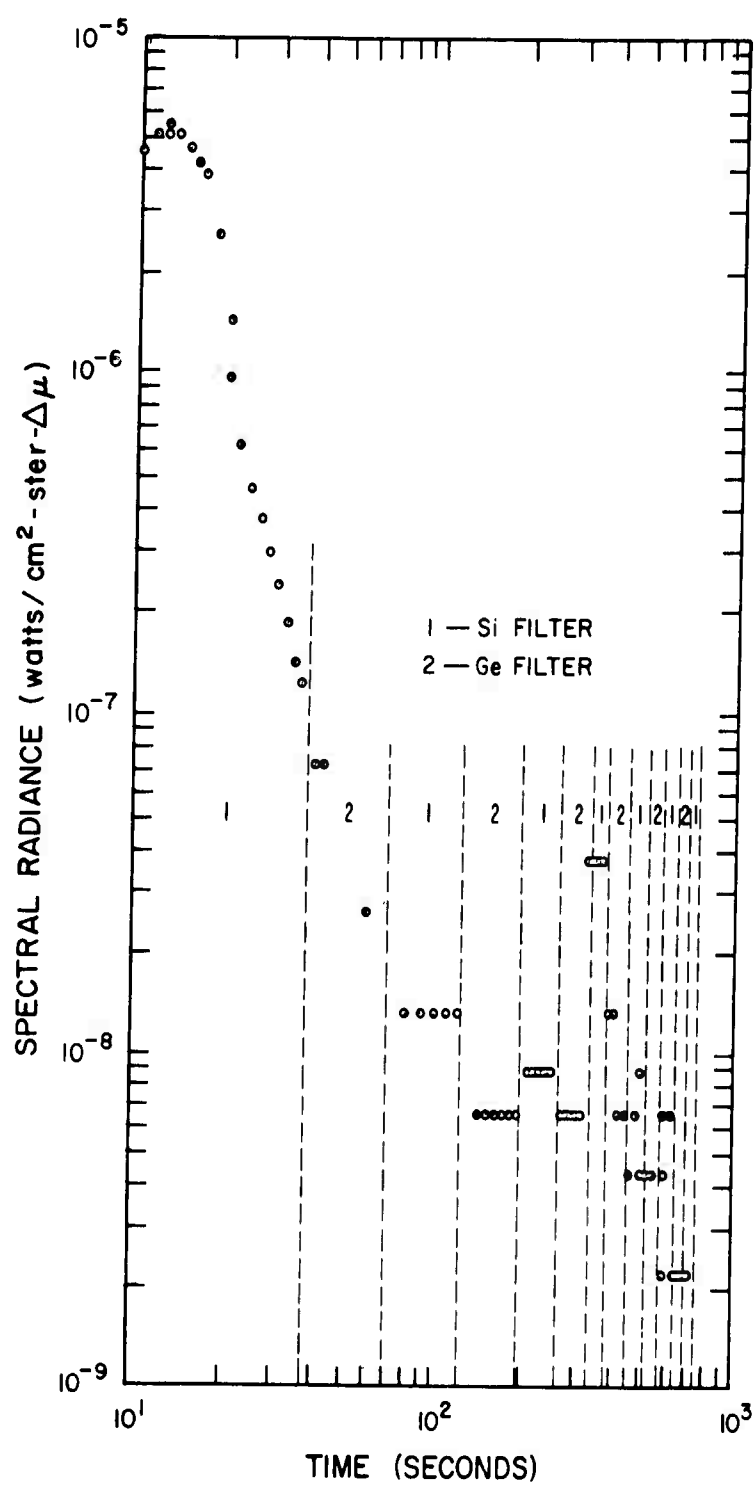


Figure 3.654 Spectral radiance, Kettle I, Tight Rope, Channel 20, late time.

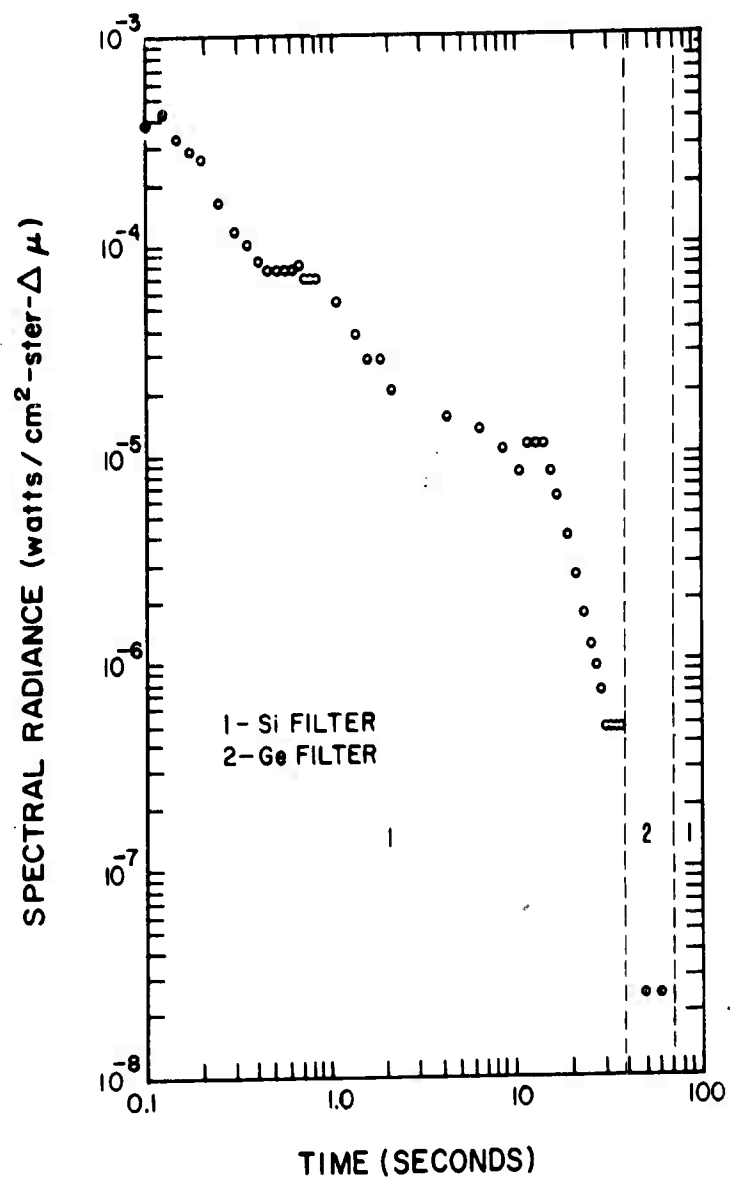


Figure 3.655 Spectral radiance, Kettle I, Tight Rope, Channel 21, early time.

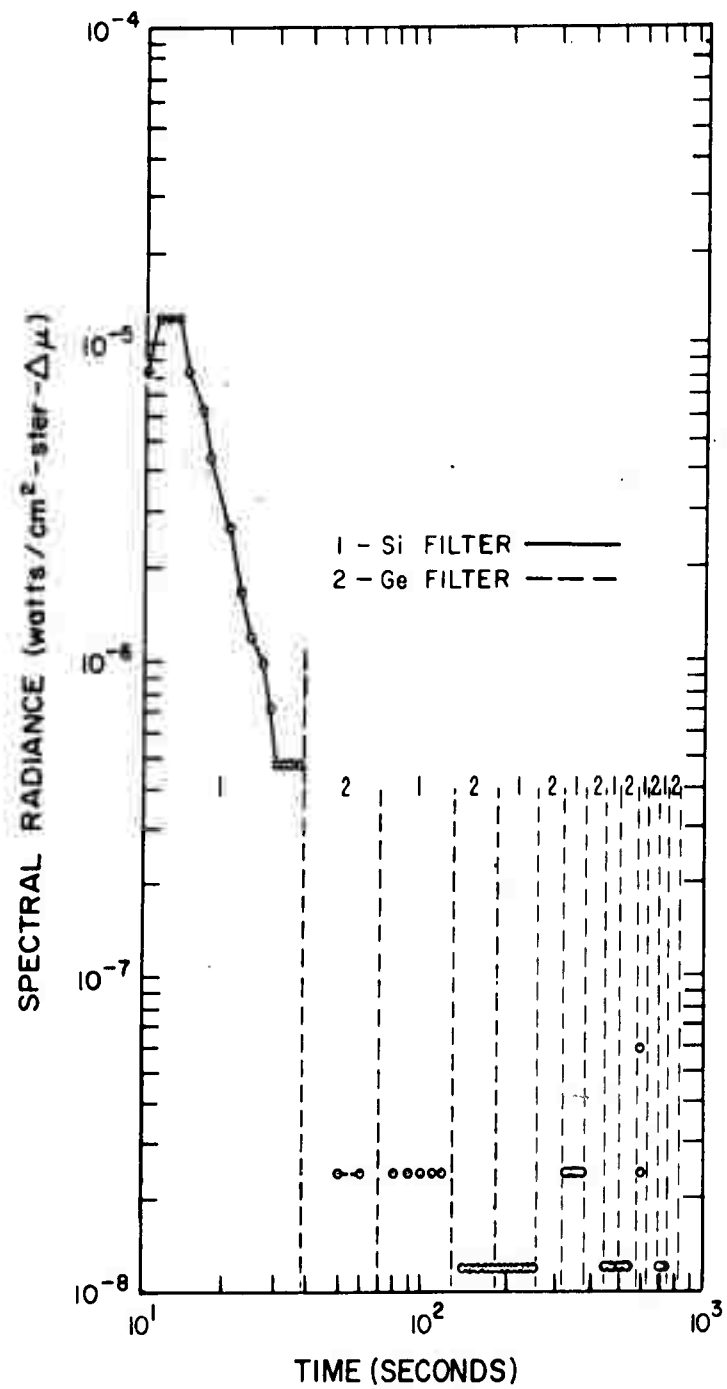


Figure 3.656 Spectral radiance, Kettle I, Tight Rope, Channel 21, late time.

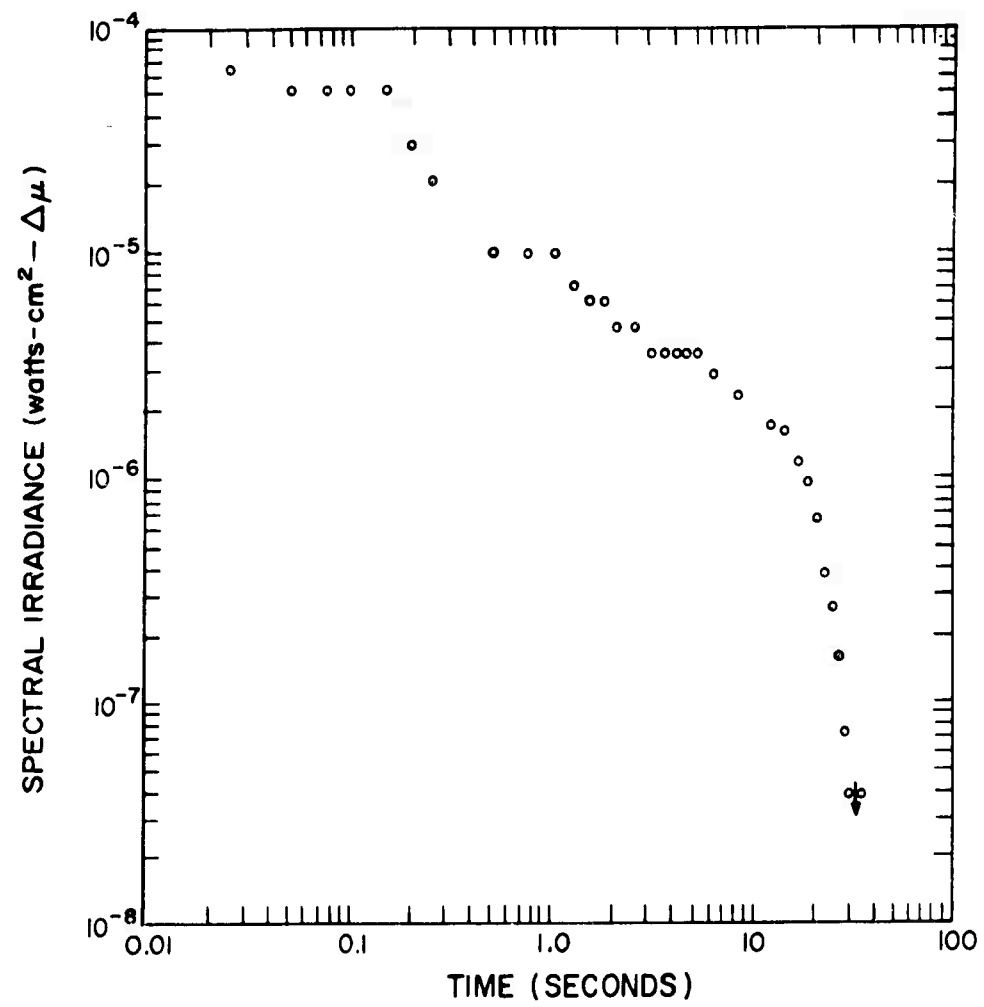


Figure 3.657 Spectral radiance, Kettle I, Tight Rope, Channel 22.

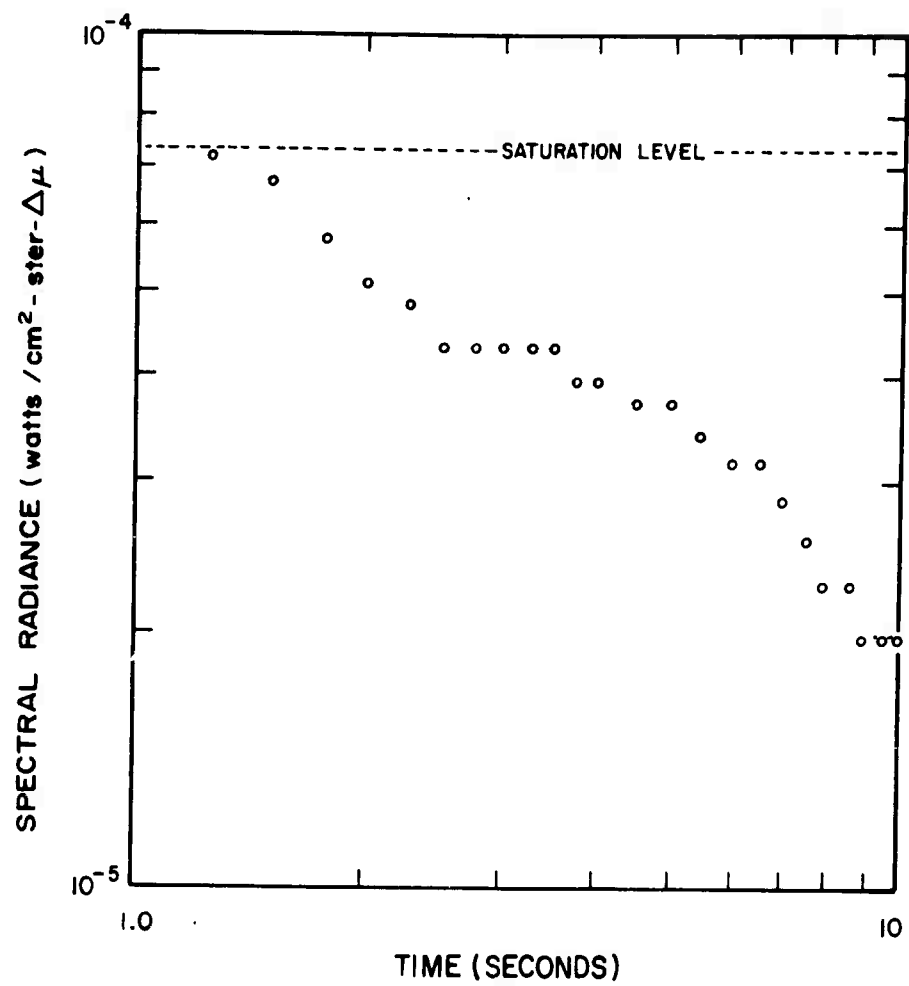


Figure 3.658 Spectral radiance, Kettle II, Tight Rope, Channel 1, early time.

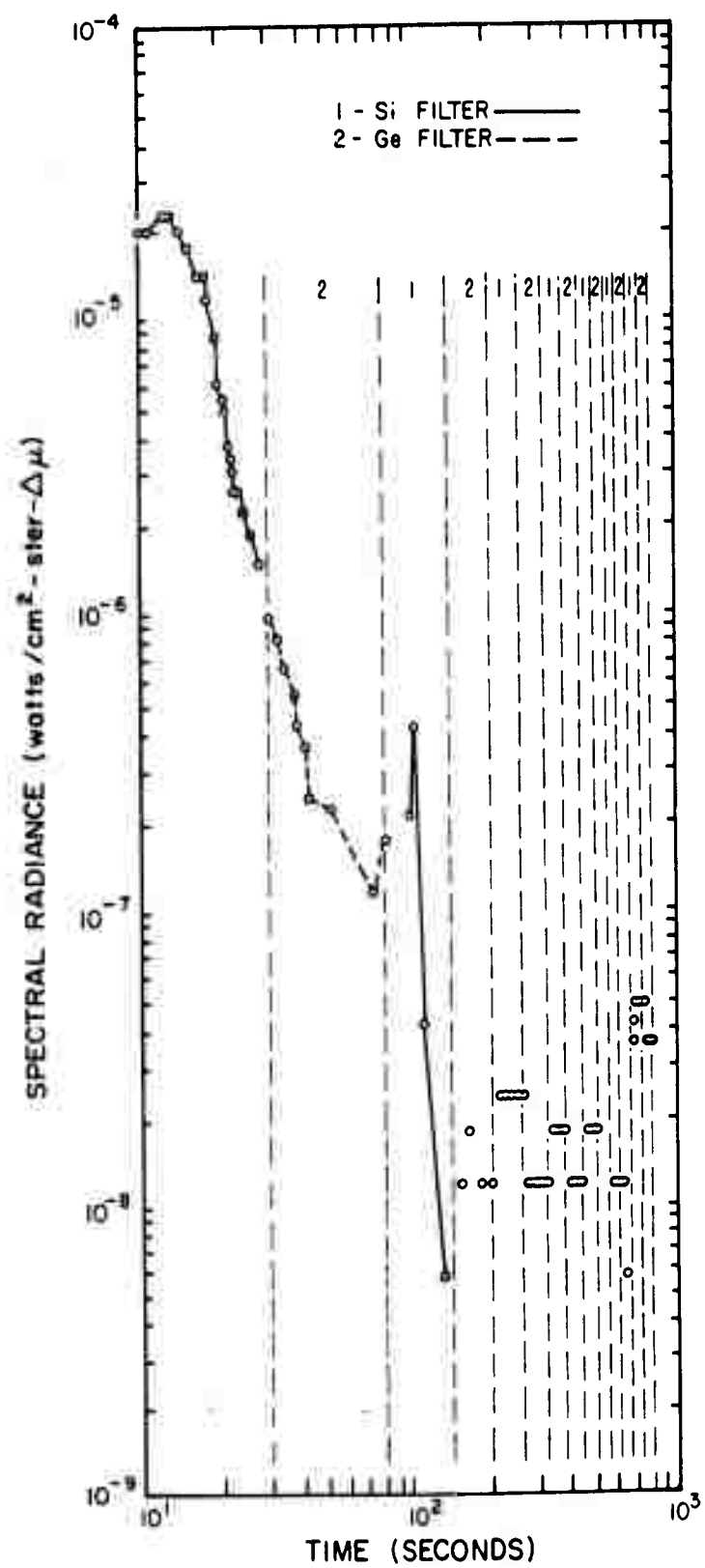


Figure 3.659 Spectral radiance, Kettle II, Tight Rope, Channel 1, late time.

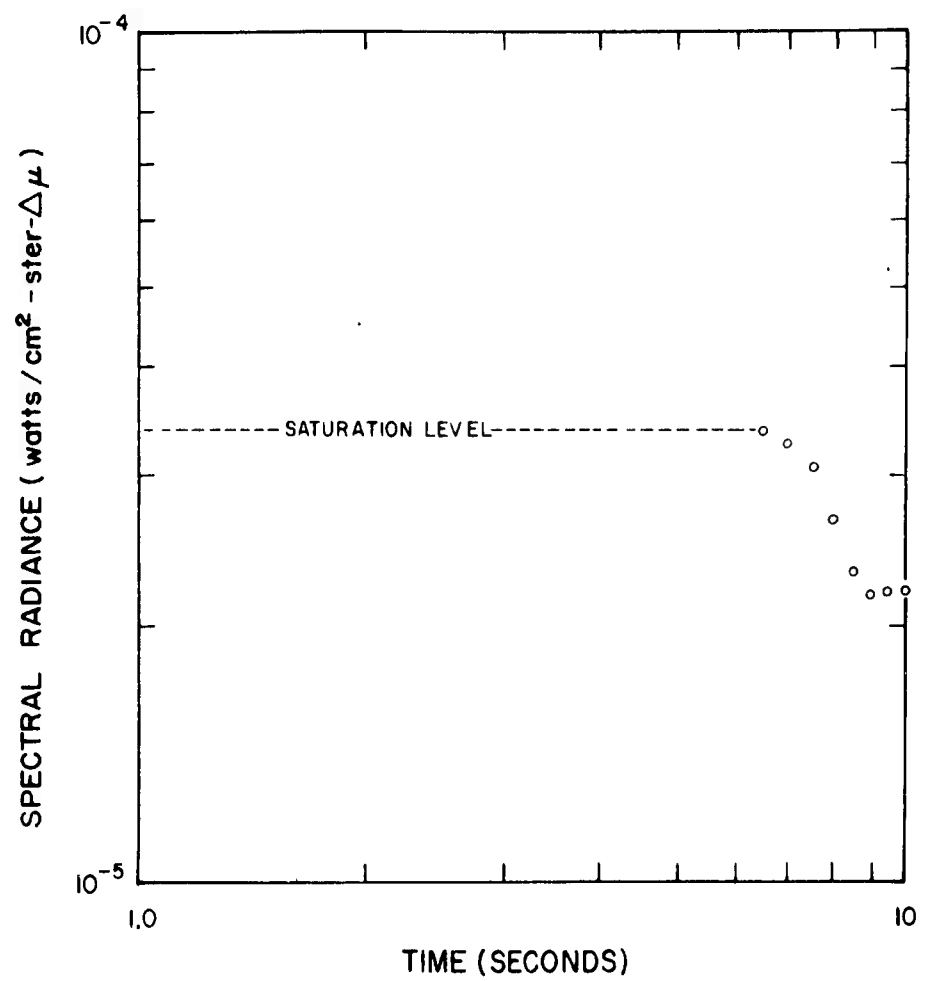


Figure 3.660 Spectral radiance, Kettle II, Tight Rope, Channel 2, early time.

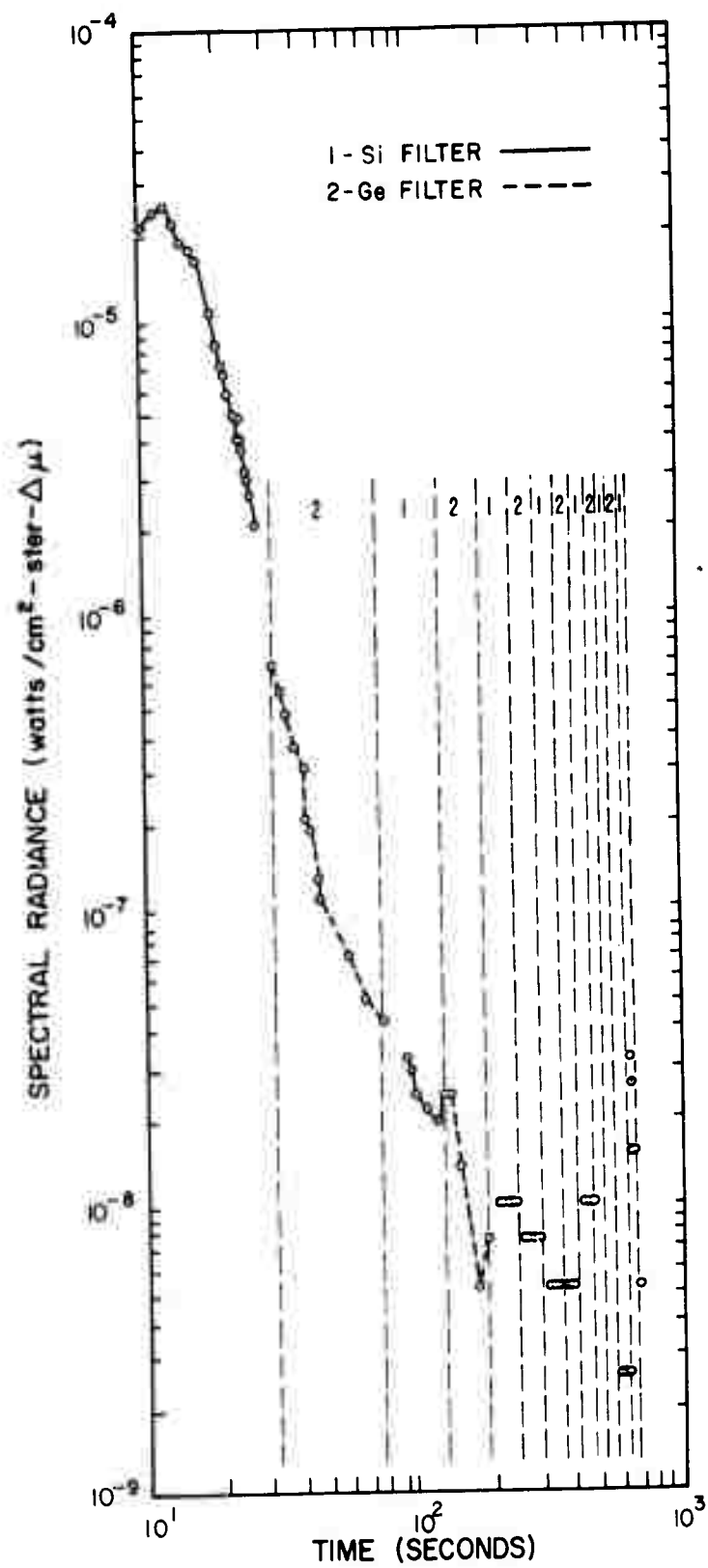


Figure 3.661 Spectral radiance, Kettle II, Tight Rope, Channel 2, late time.

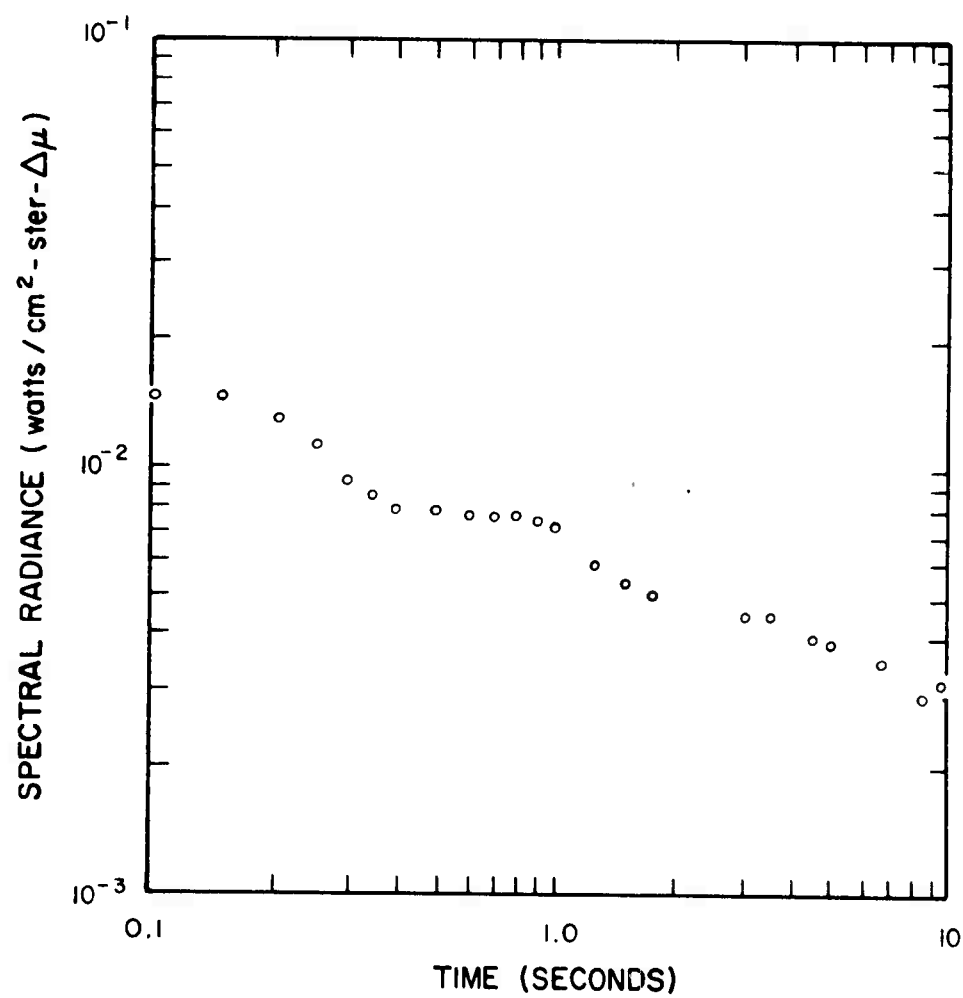


Figure 3.662 Spectral radiance, Kettle II, Tight Rope, Channel 3, early time.

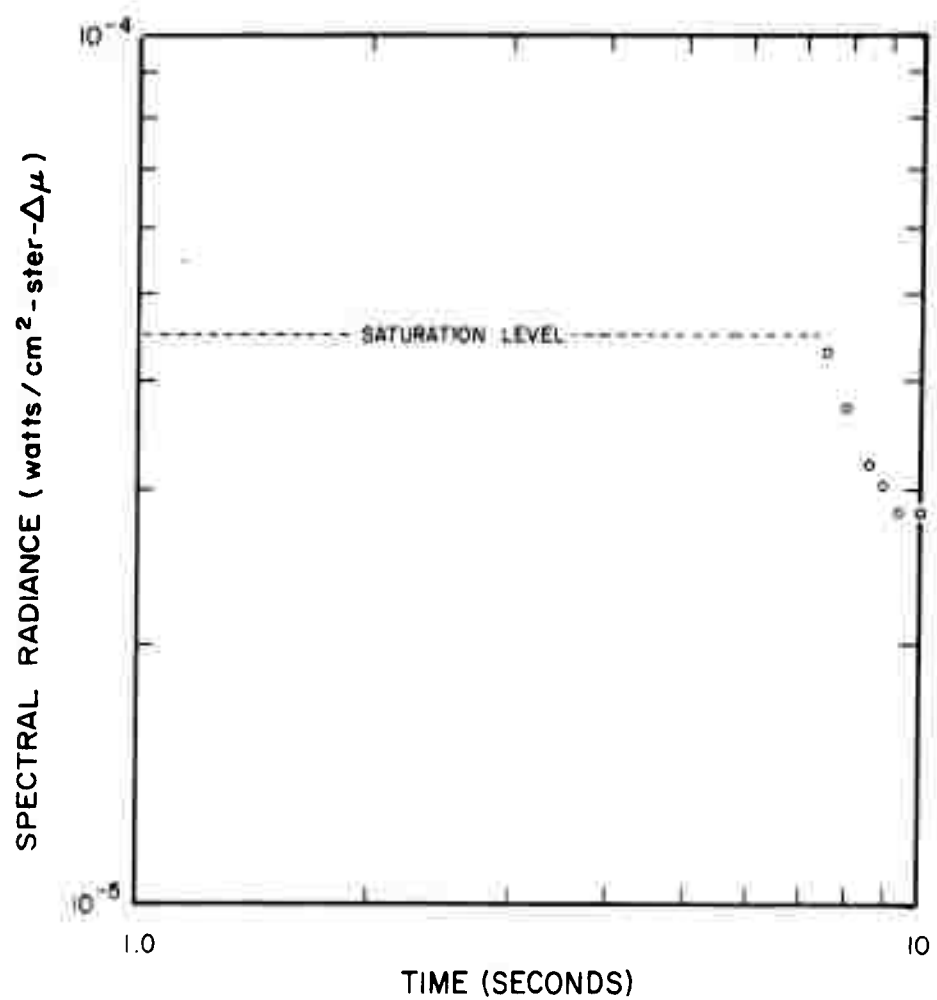


Figure 3.664 Spectral radiance, Kettle II, Tight Rope, Channel 4, early time.

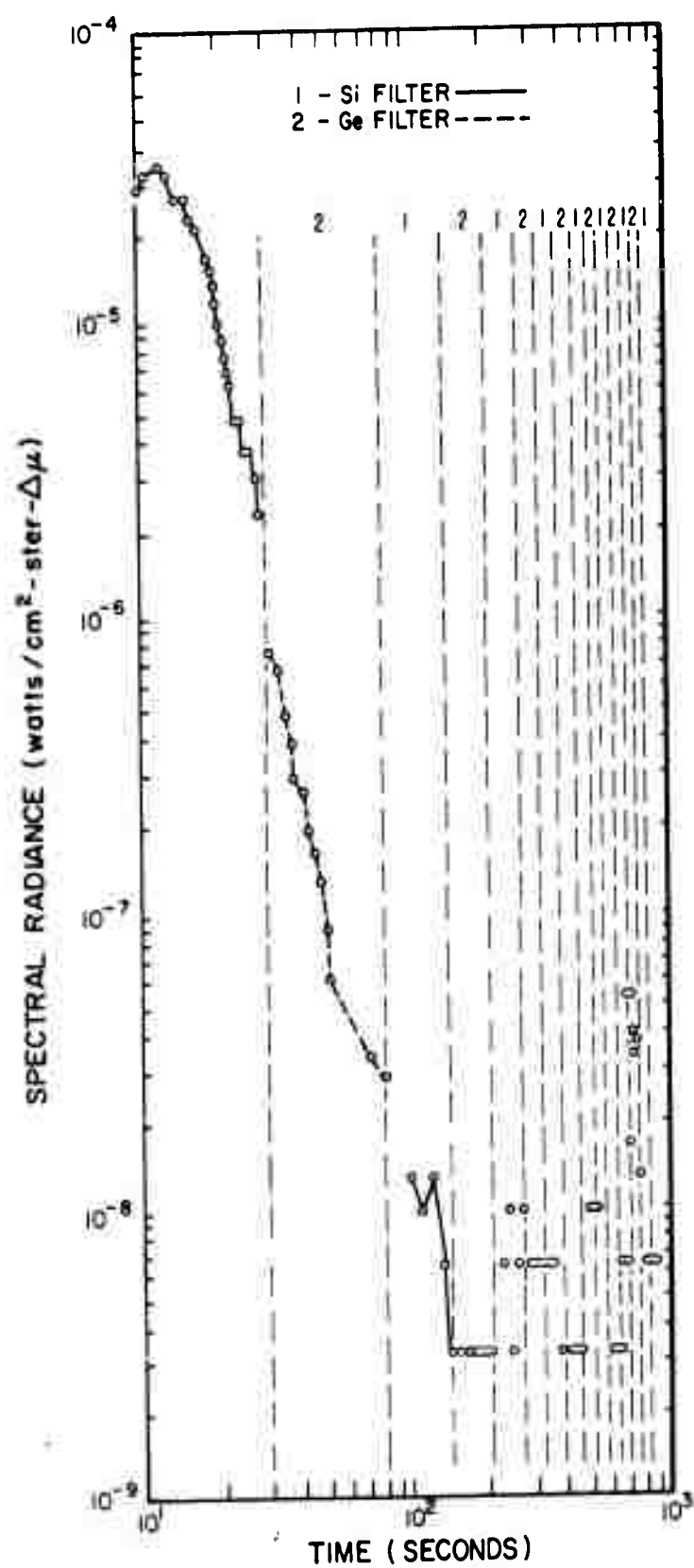


Figure 3.665 Spectral radiance, Kettle II, Tight Rope, Channel 4, late time.

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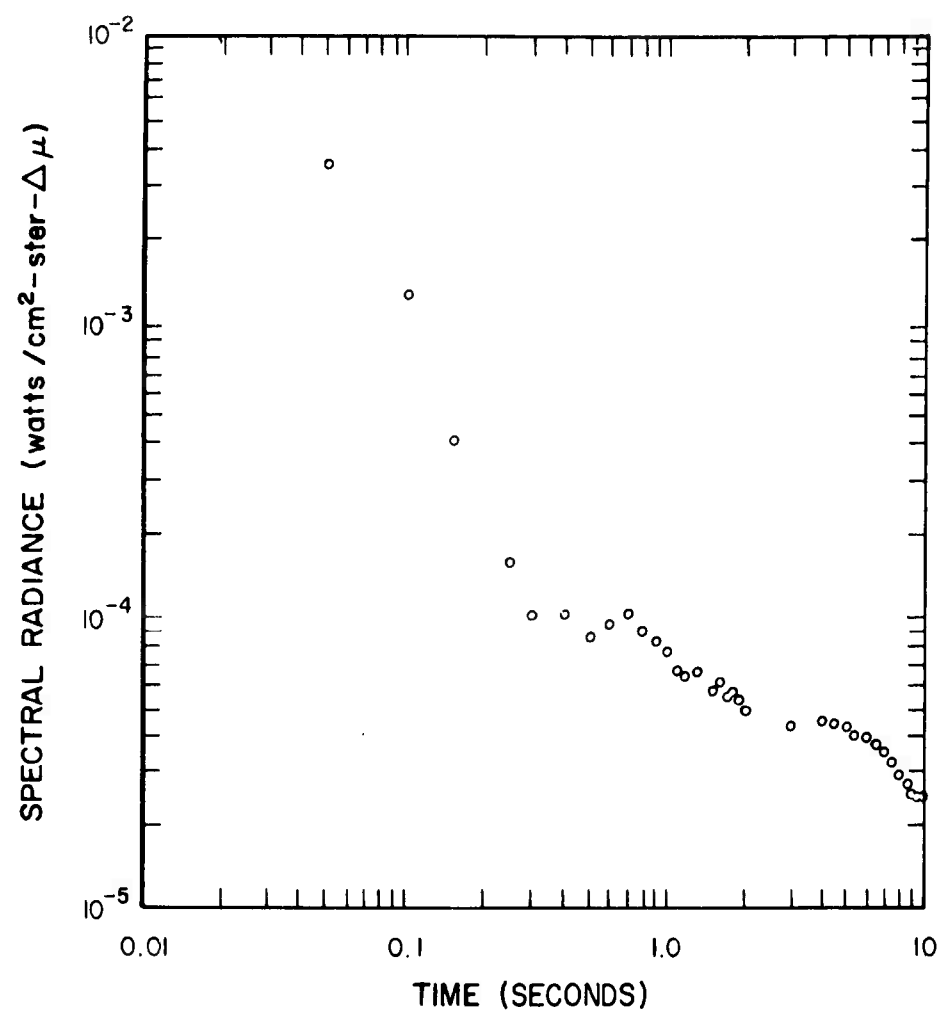


Figure 3.666 Spectral radiance, Kettle II, Tight Rope, Channel 5, early time.

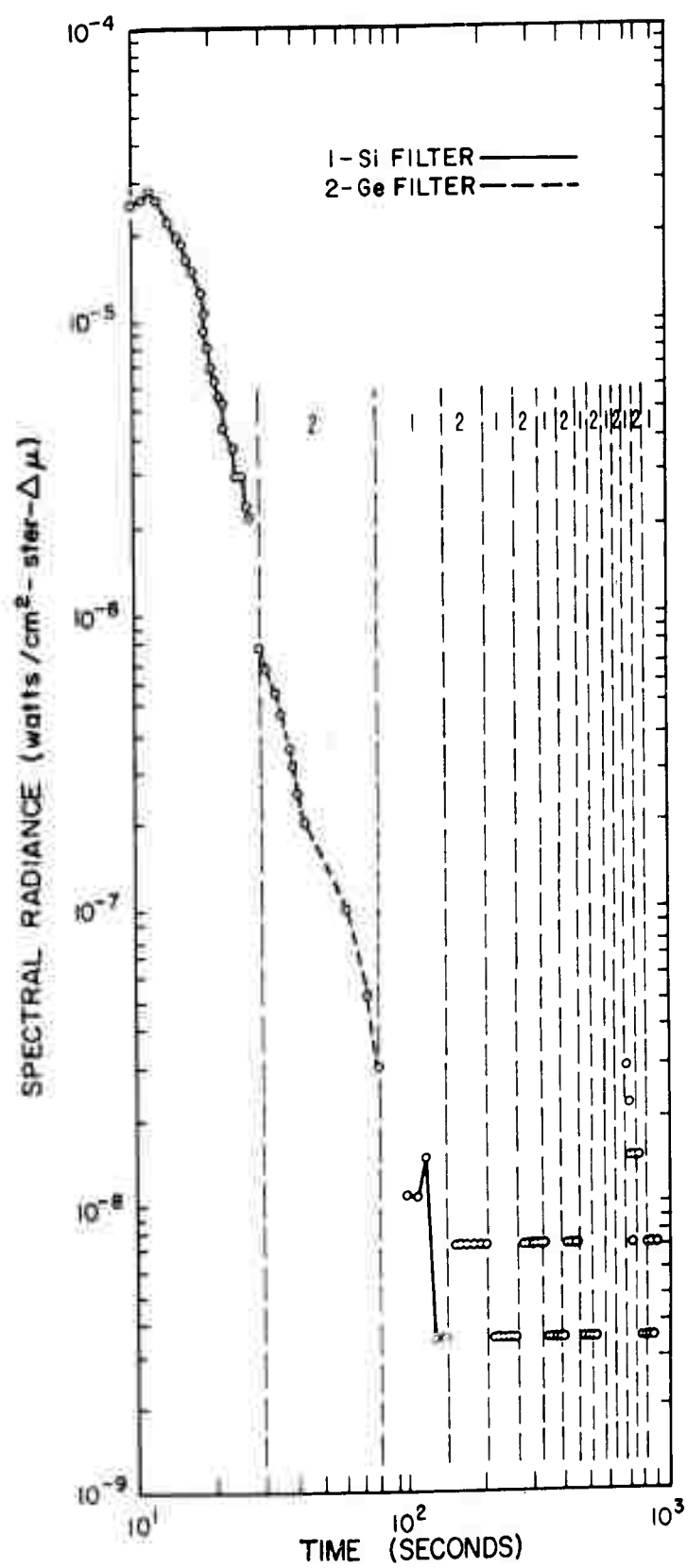


Figure 3.667 Spectral radiance, Kettle II, Tight Rope, Channel 5, late time.

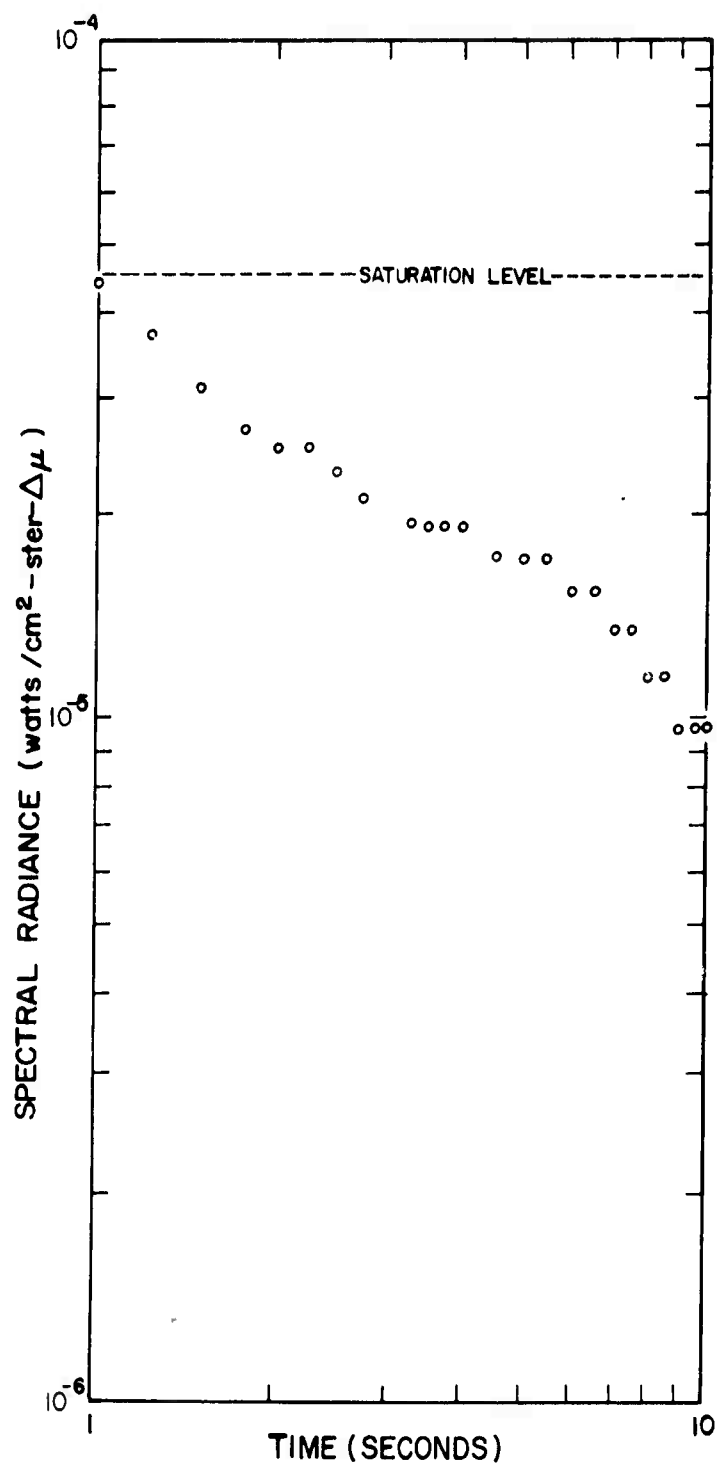


Figure 3.668 Spectral radiance, Kettle II, Tight Rope, Channel 6, early time.

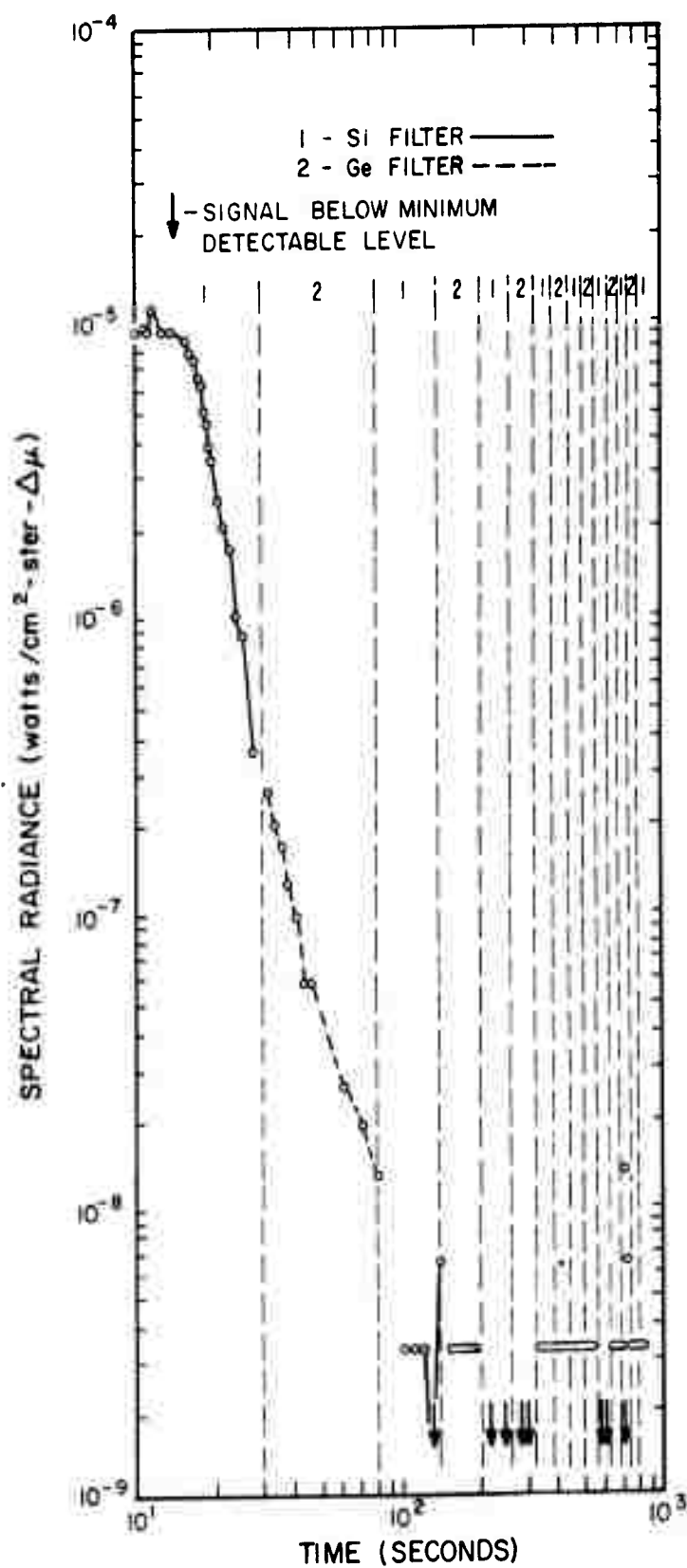


Figure 3.669 Spectral radiance, Kettle II, Tight Rope, Channel 6, late time.

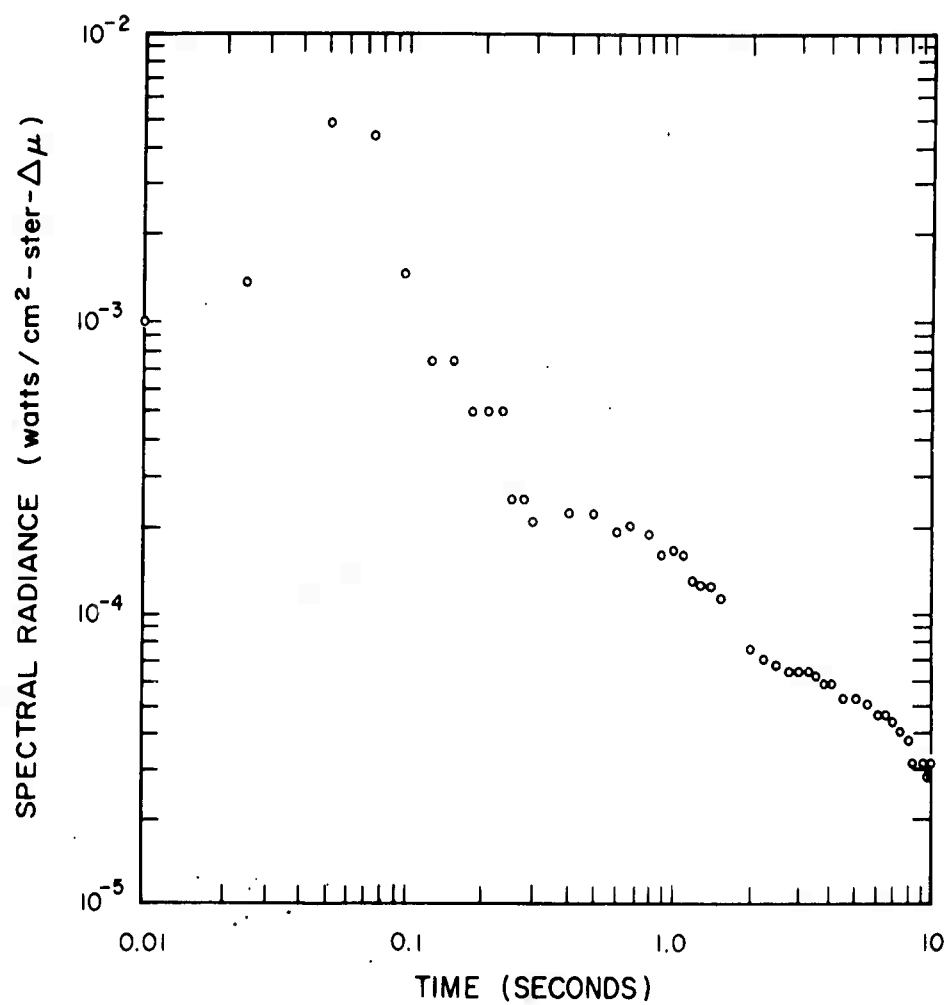


Figure 3.670 Spectral radiance, Kettle II, Tight Rope, Channel 7, early time.

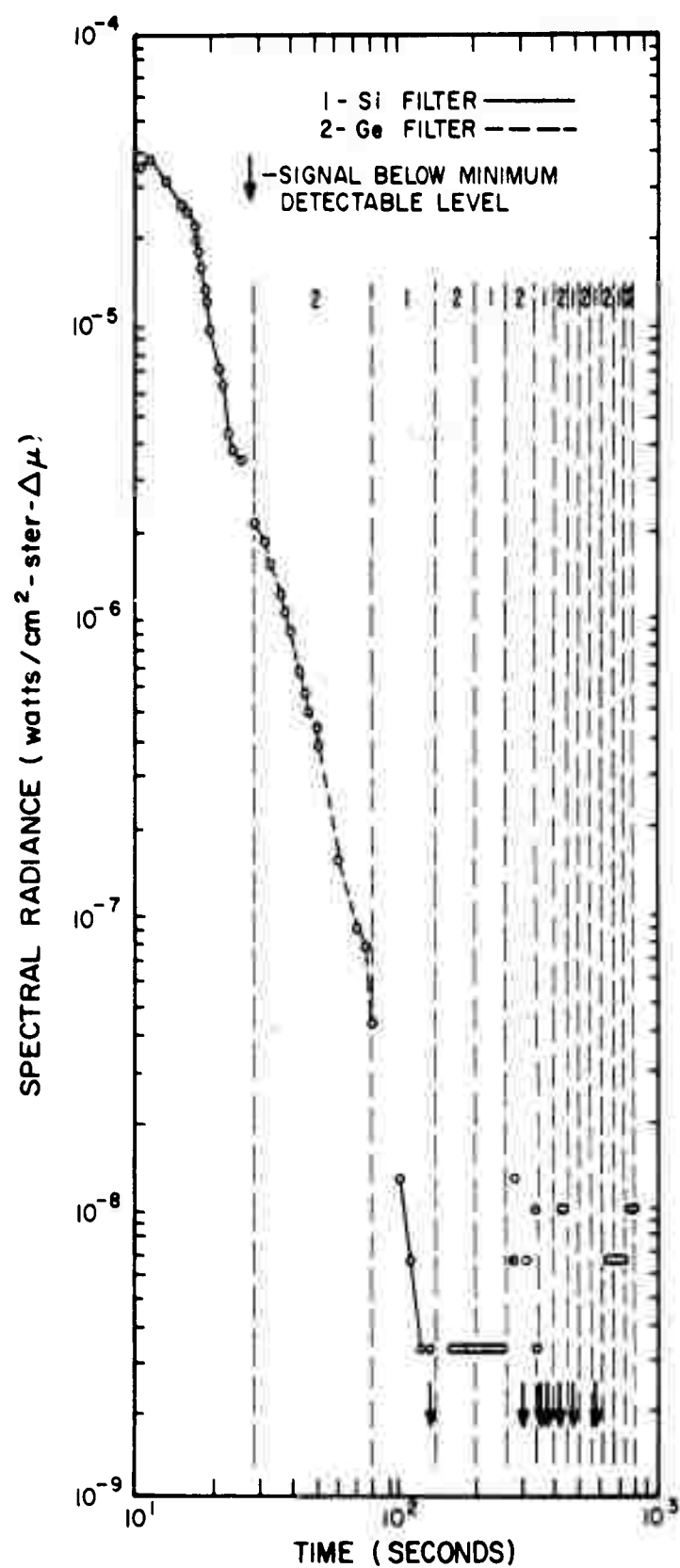


Figure 3.671 Spectral radiance, Kettle II, Tight Rope, Channel 7, late time.

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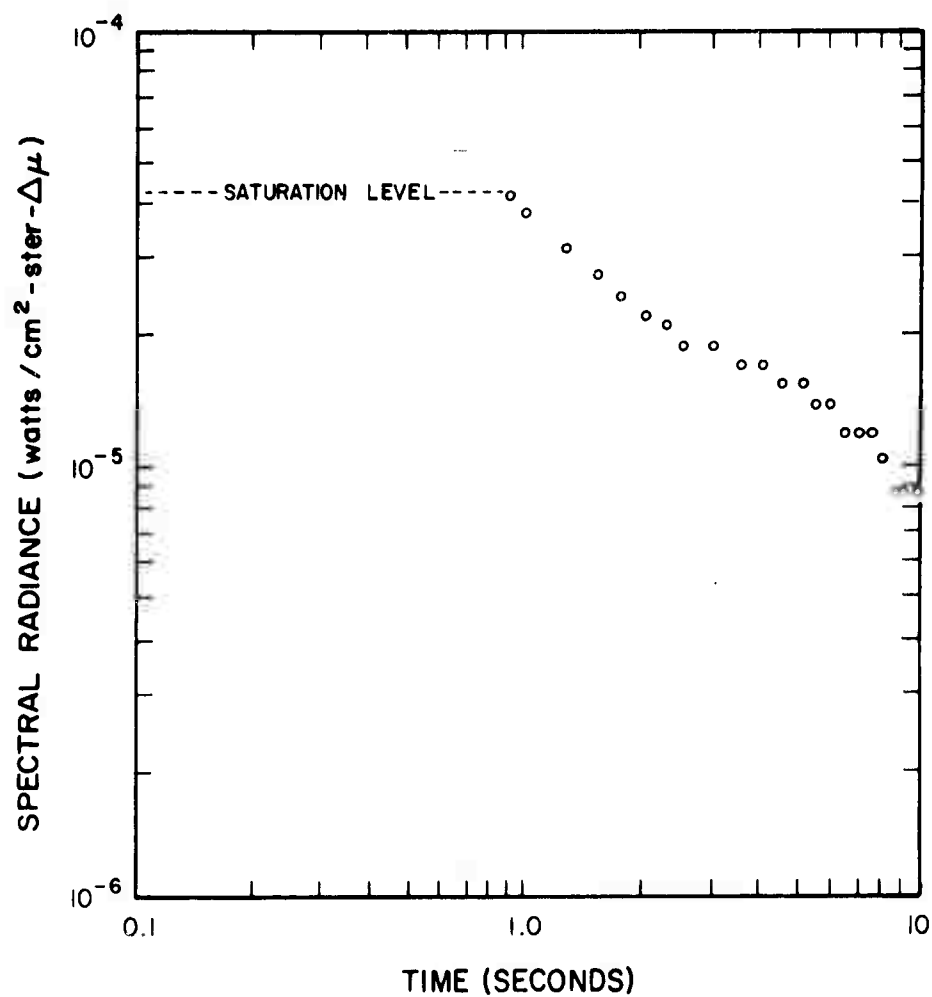


Figure 3.672 Spectral radiance, Kettle II, Tight Rope, Channel 8, early time.

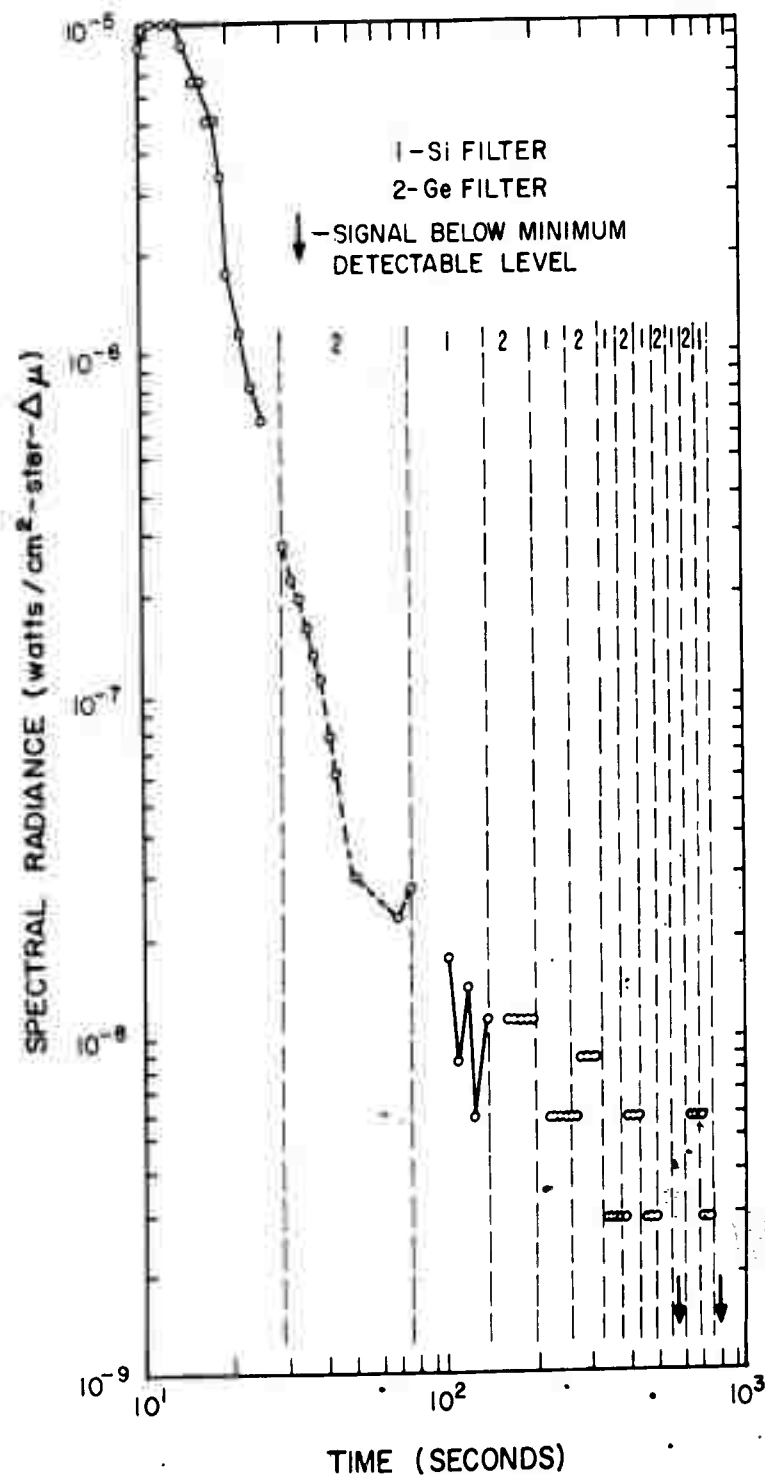


Figure 3.673 Spectral radiance, Kettle II, Tight Rope, Channel 8, late time.

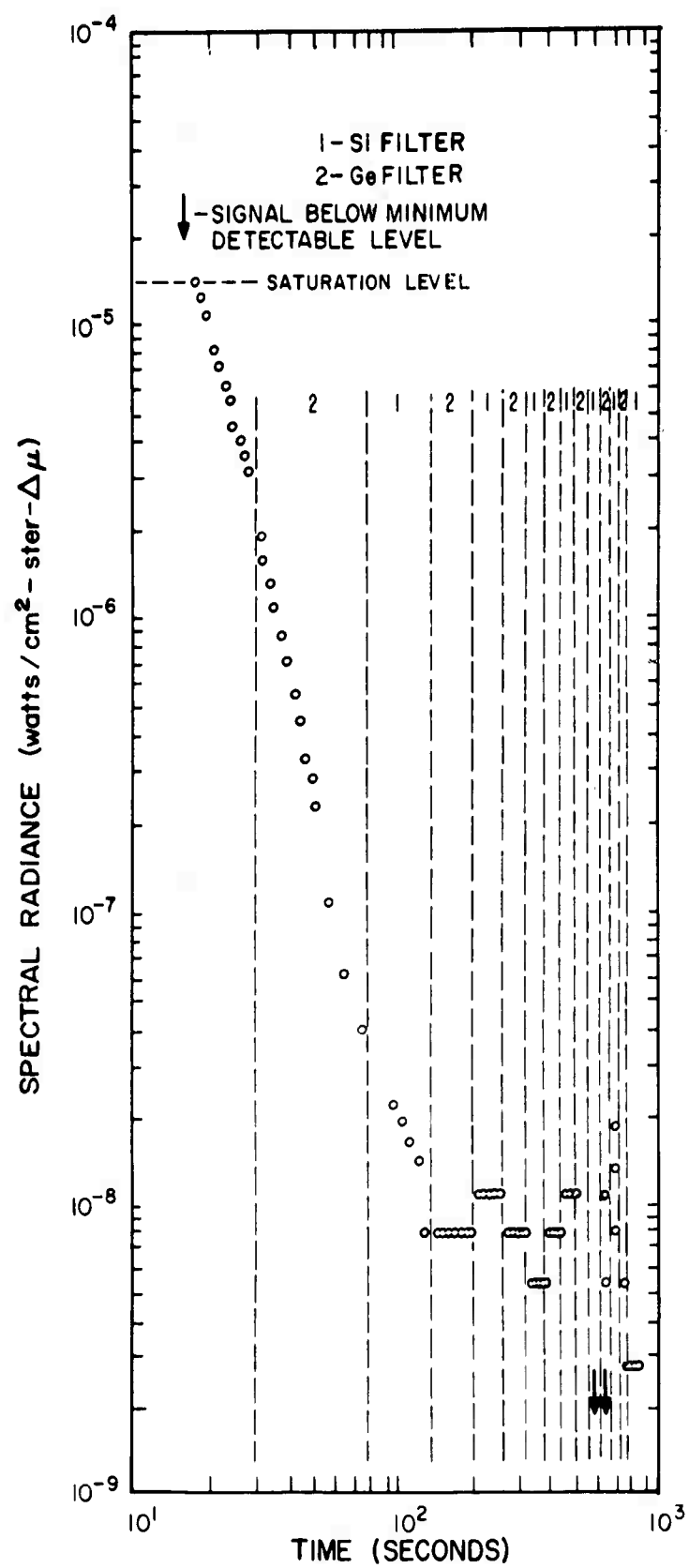


Figure 3.674 Spectral radiance, Kettle II, Tight Rope,
Channel 9.

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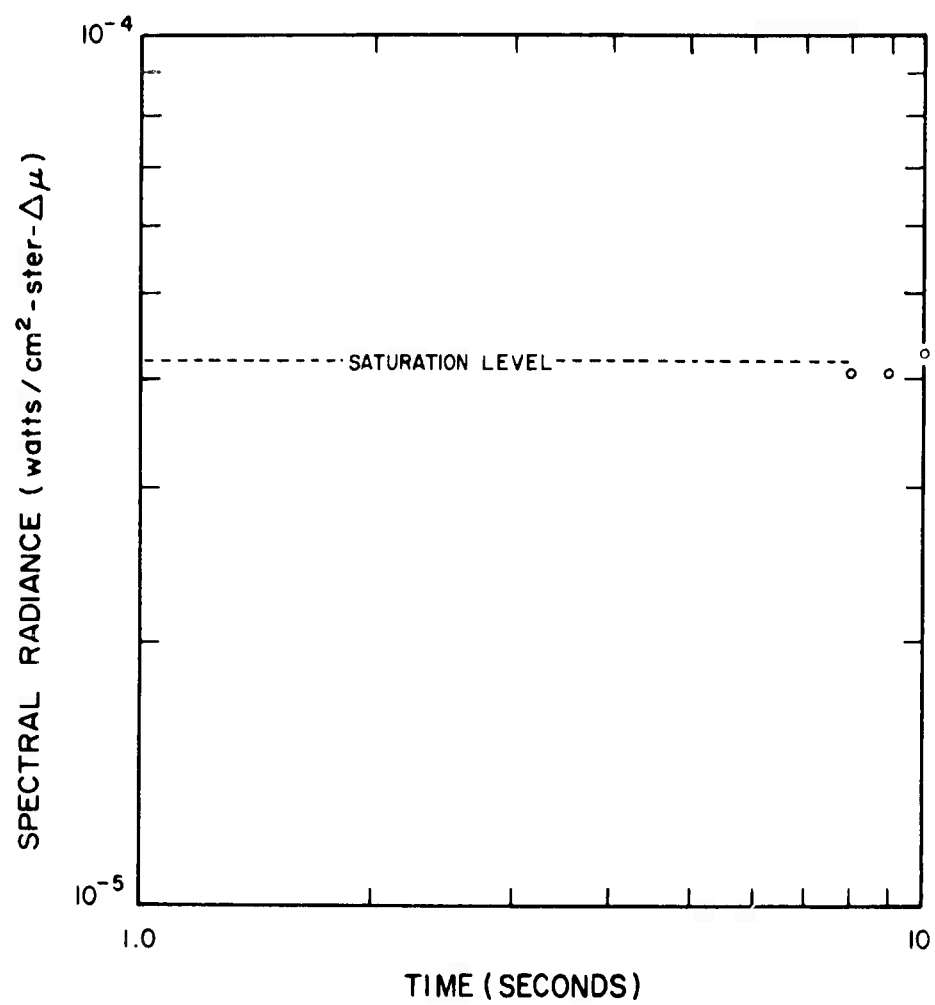


Figure 3.675 Spectral radiance, Kettle II, Tight Rope, Channel 14, early time.

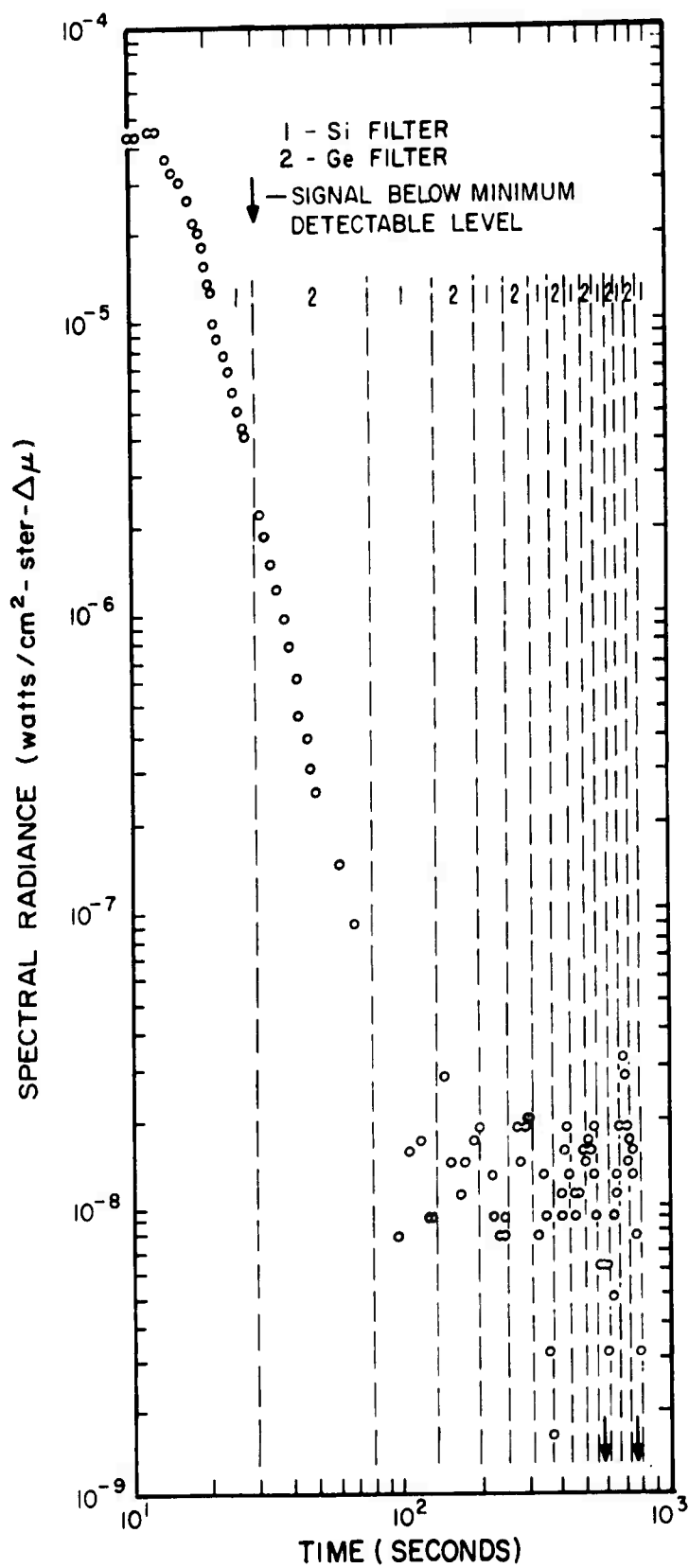


Figure 3.676 Spectral radiance, Kettle II, Tight Rope, Channel 14, late time. 353

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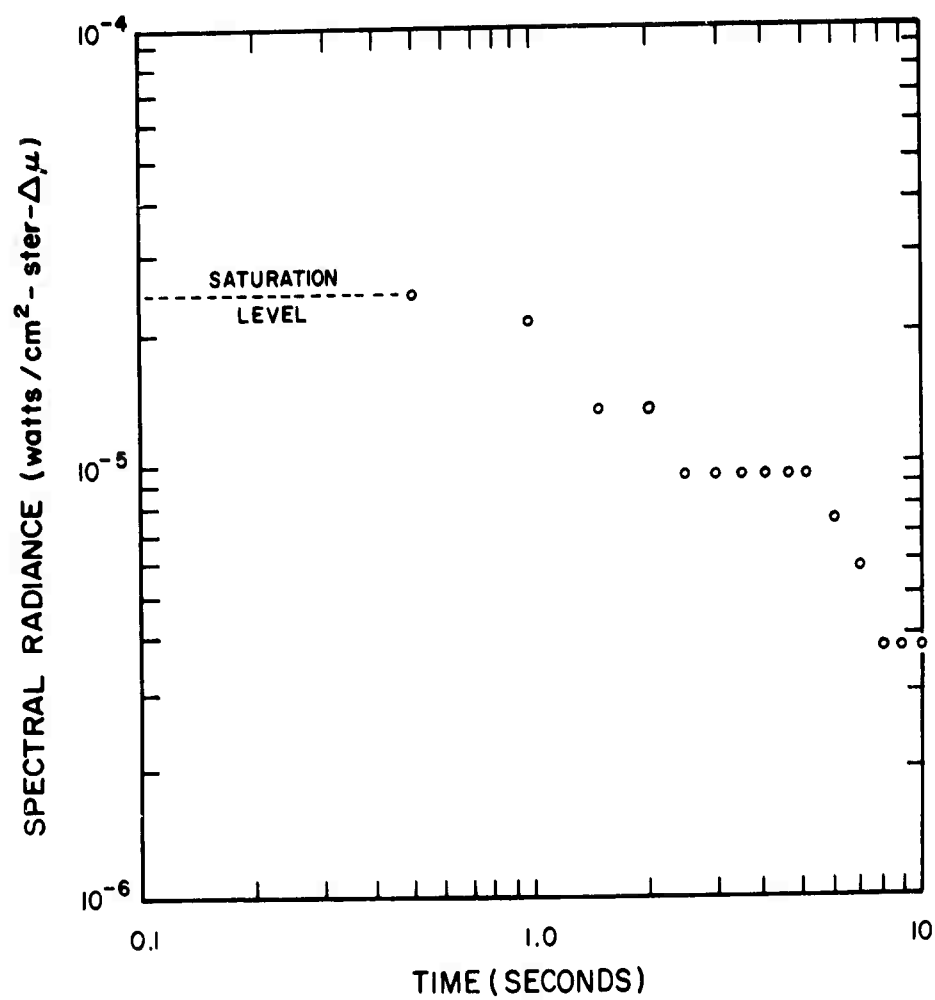


Figure 3.677 Spectral radiance, Kettle II, Tight Rope, Channel 15, early time.

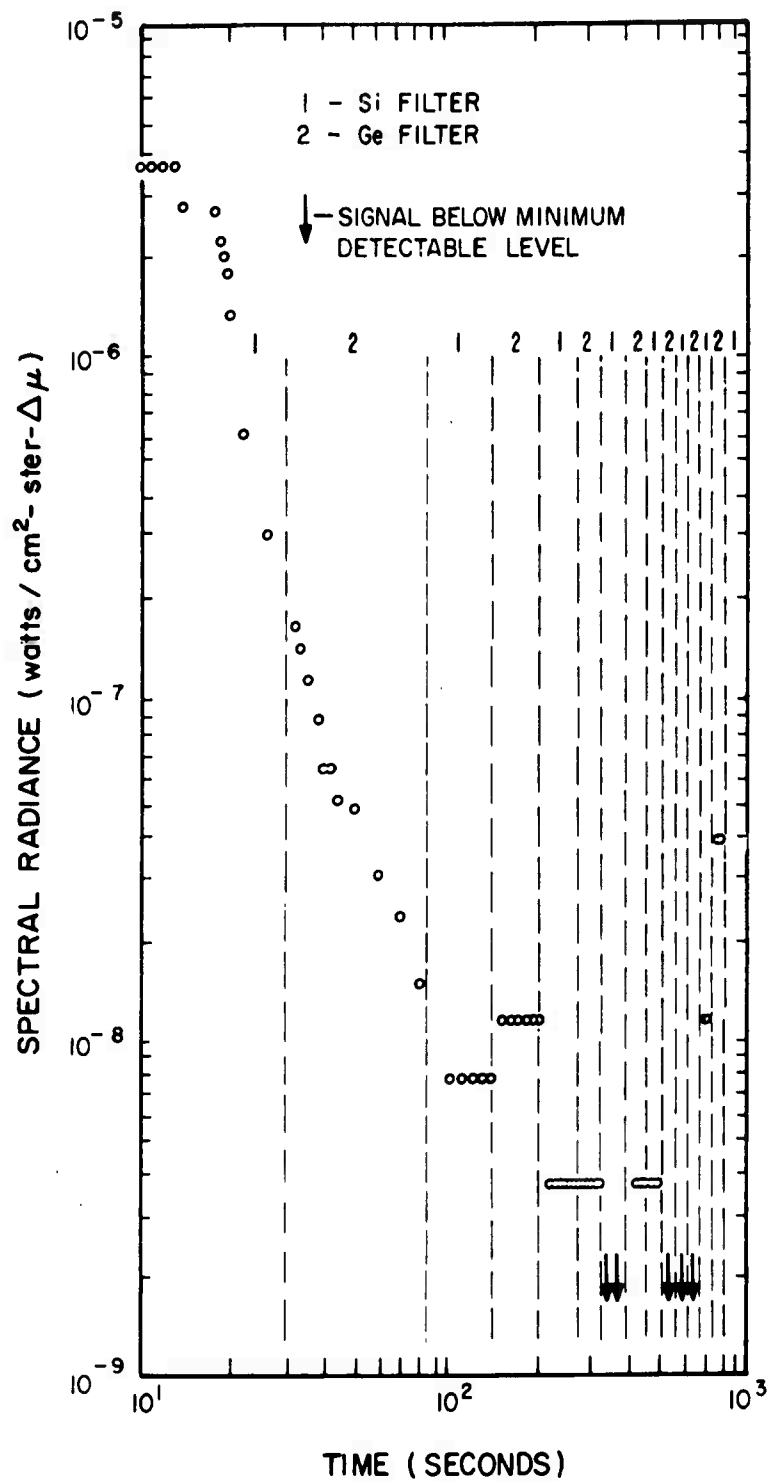


Figure 3.678 Spectral radiance, Kettle II, Tight Rope, Channel 15, late time.

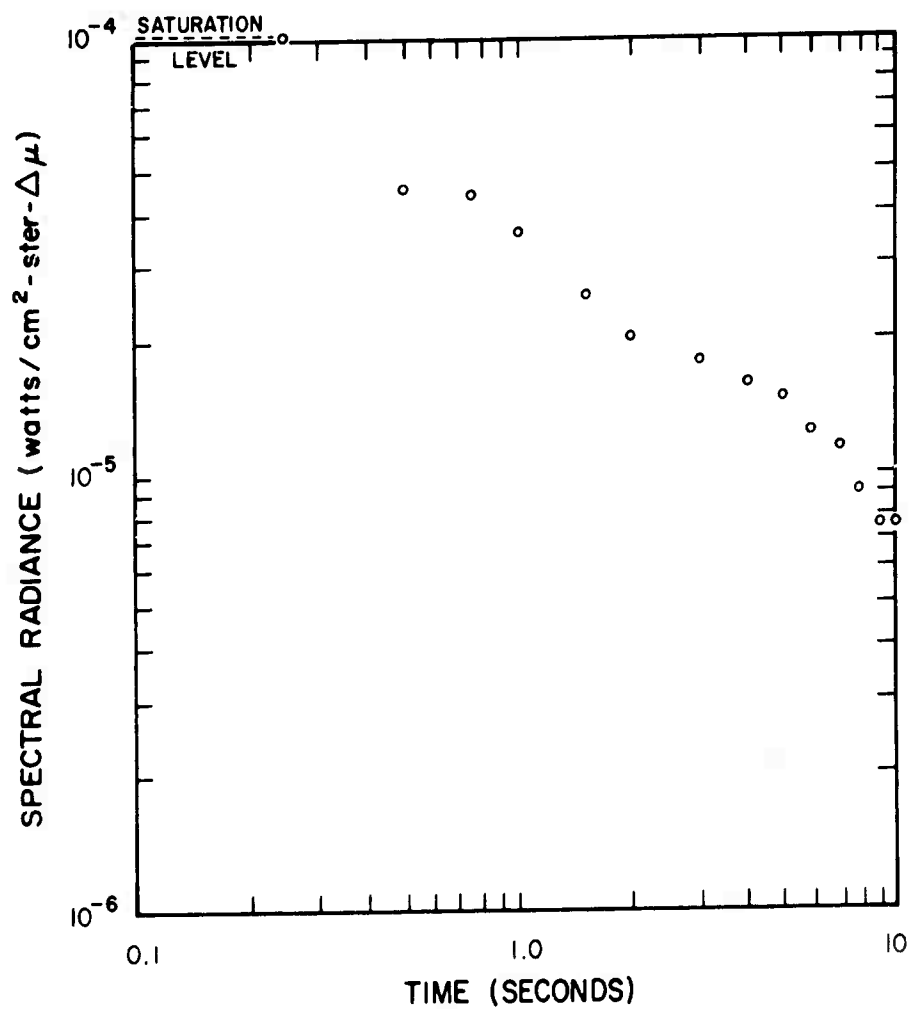


Figure 3.679 Spectral radiance, Kettle II, Tight Rope, Channel-16, early time.

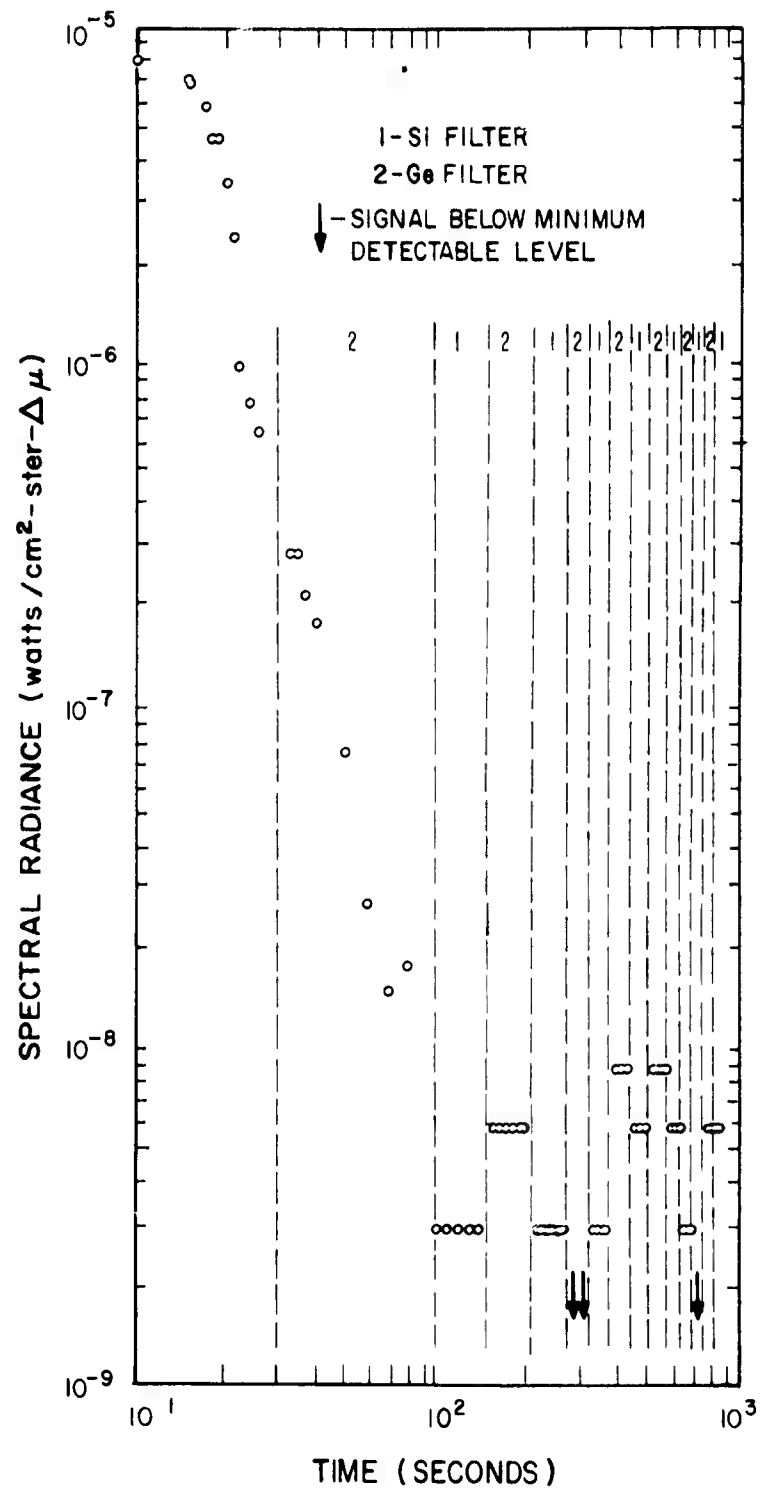


Figure 3.680 Spectral radiance, Kettle II, Tight Rope, Channel 16, late time.

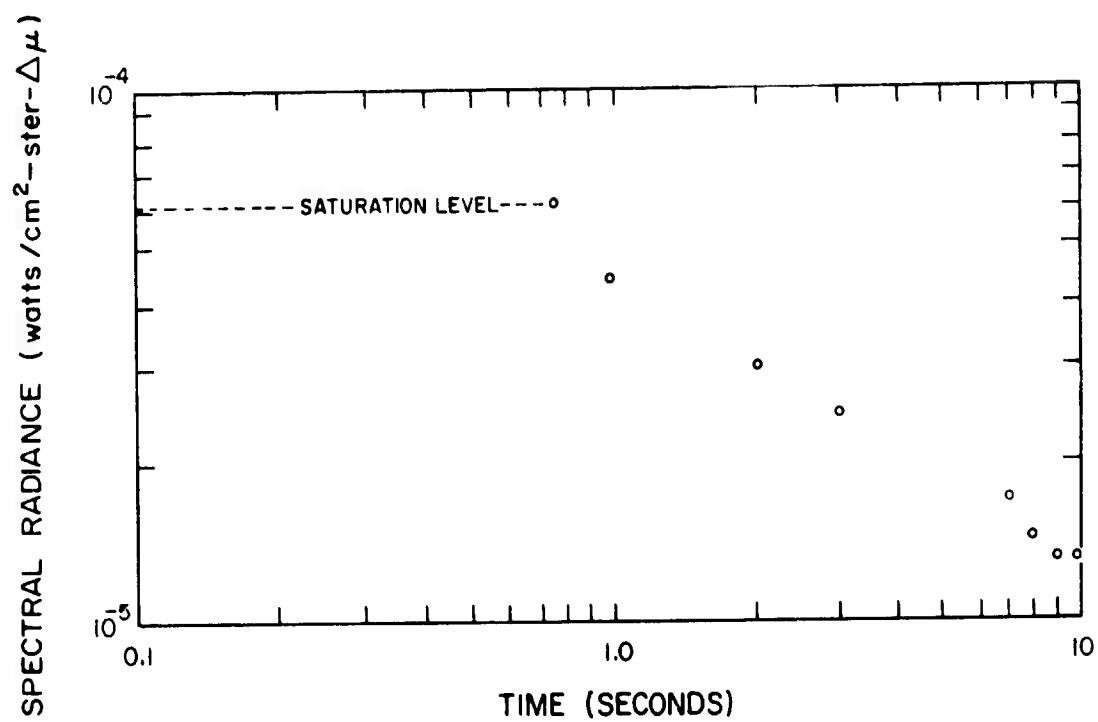


Figure 3.681 Spectral radiance, Kettle II, Tight Rope, Channel 17, early time.

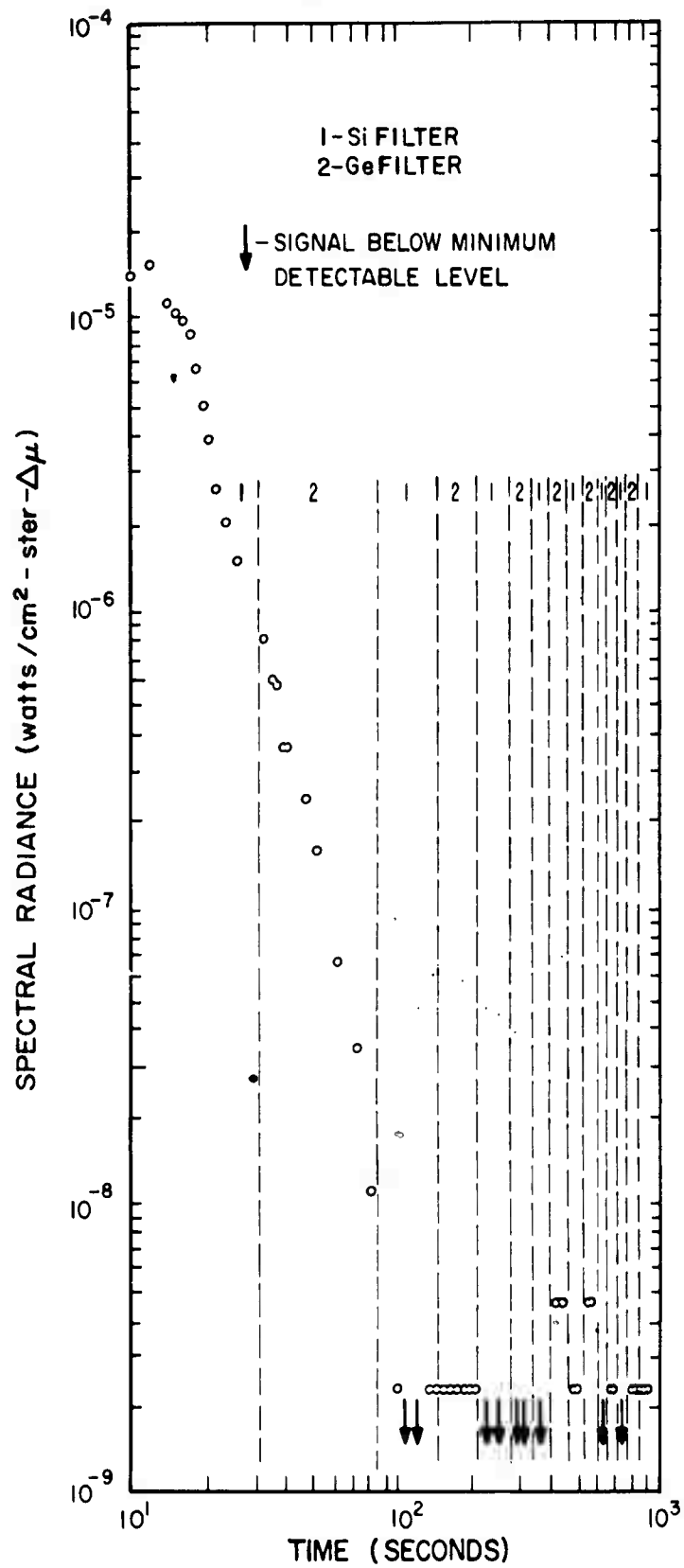


Figure 3.682 Spectral radiance, Kettle II, Tight Rope, Channel 17, late time. 359

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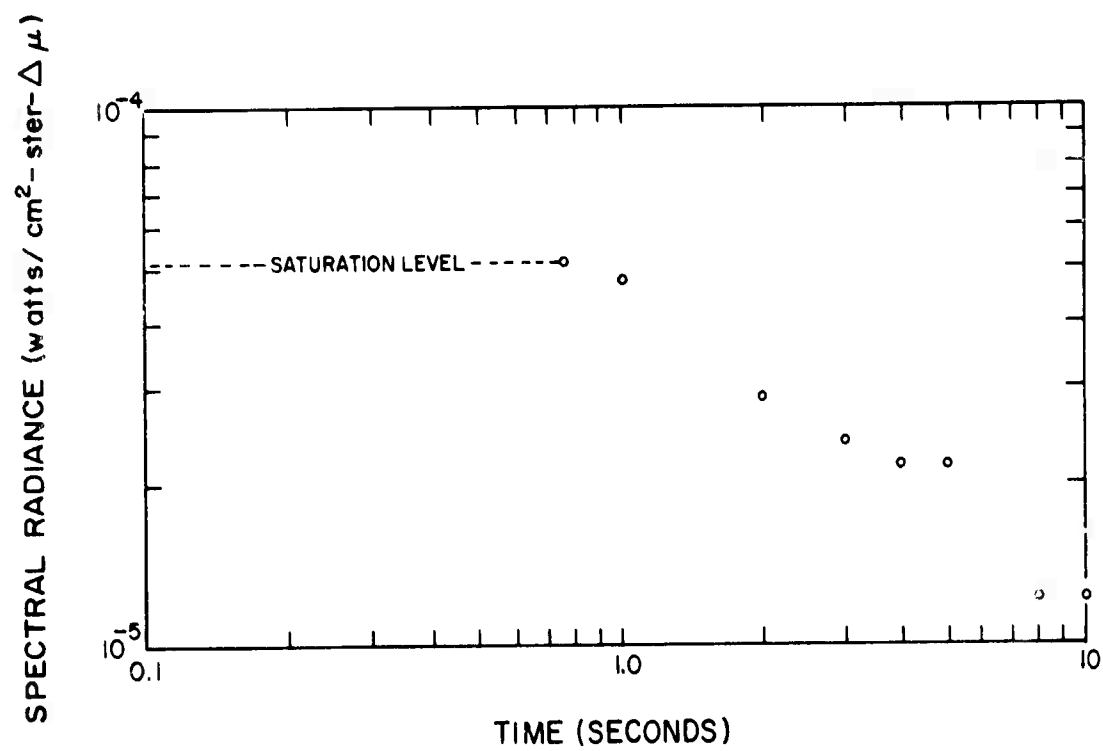


Figure 3.683 Spectral radiance, Kettle II, Tight Rope, Channel 18, early time.

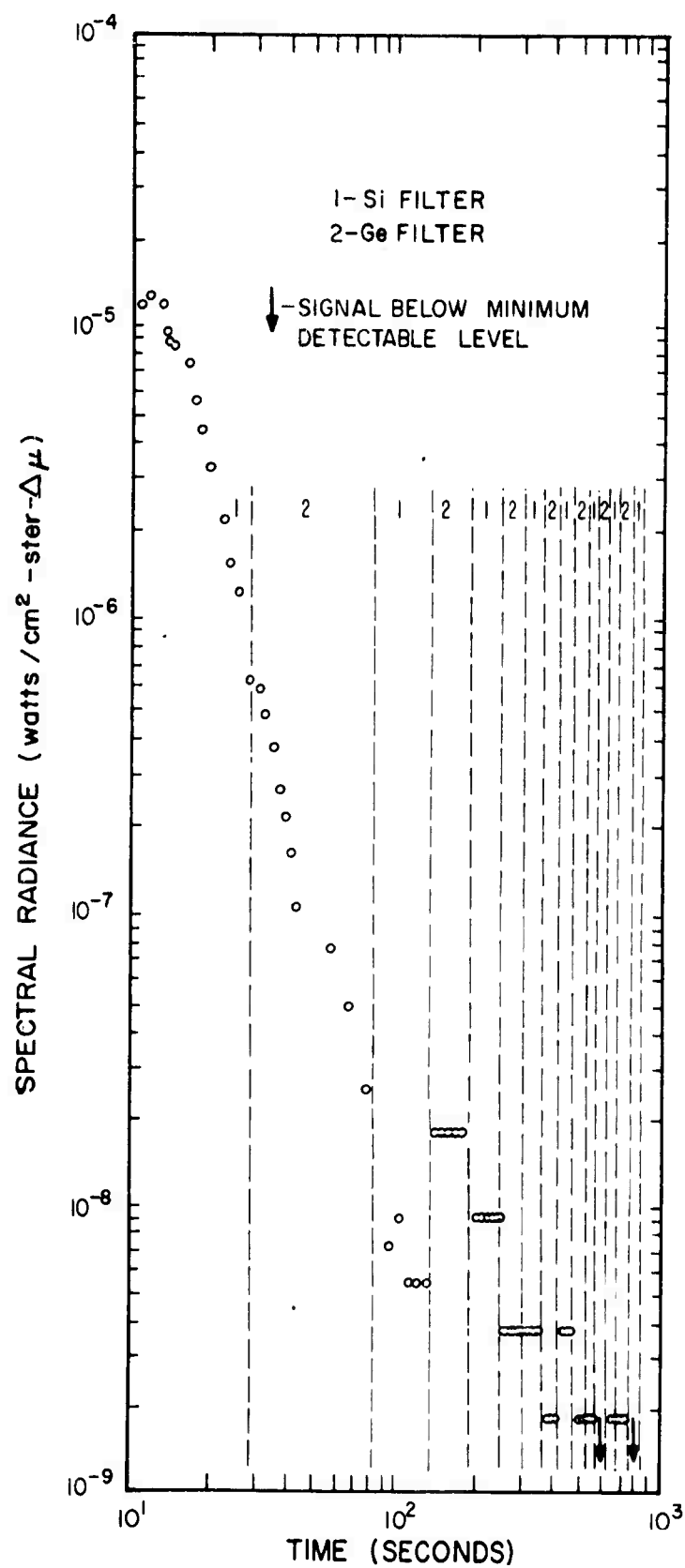


Figure 3.684 Spectral radiance, Kettle II, Tight Rope, Channel 18, late time. 361

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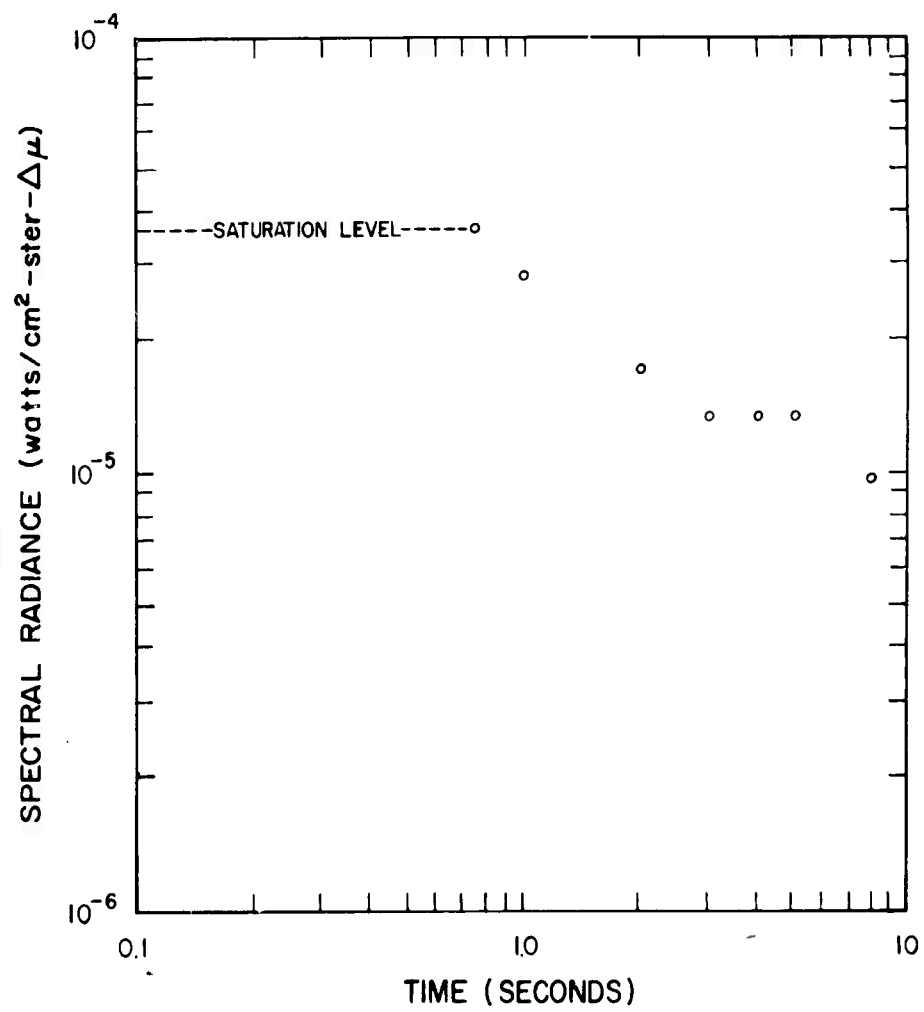


Figure 3.685 Spectral radiance, Kettle II, Tight Rope, Channel 19, early time.

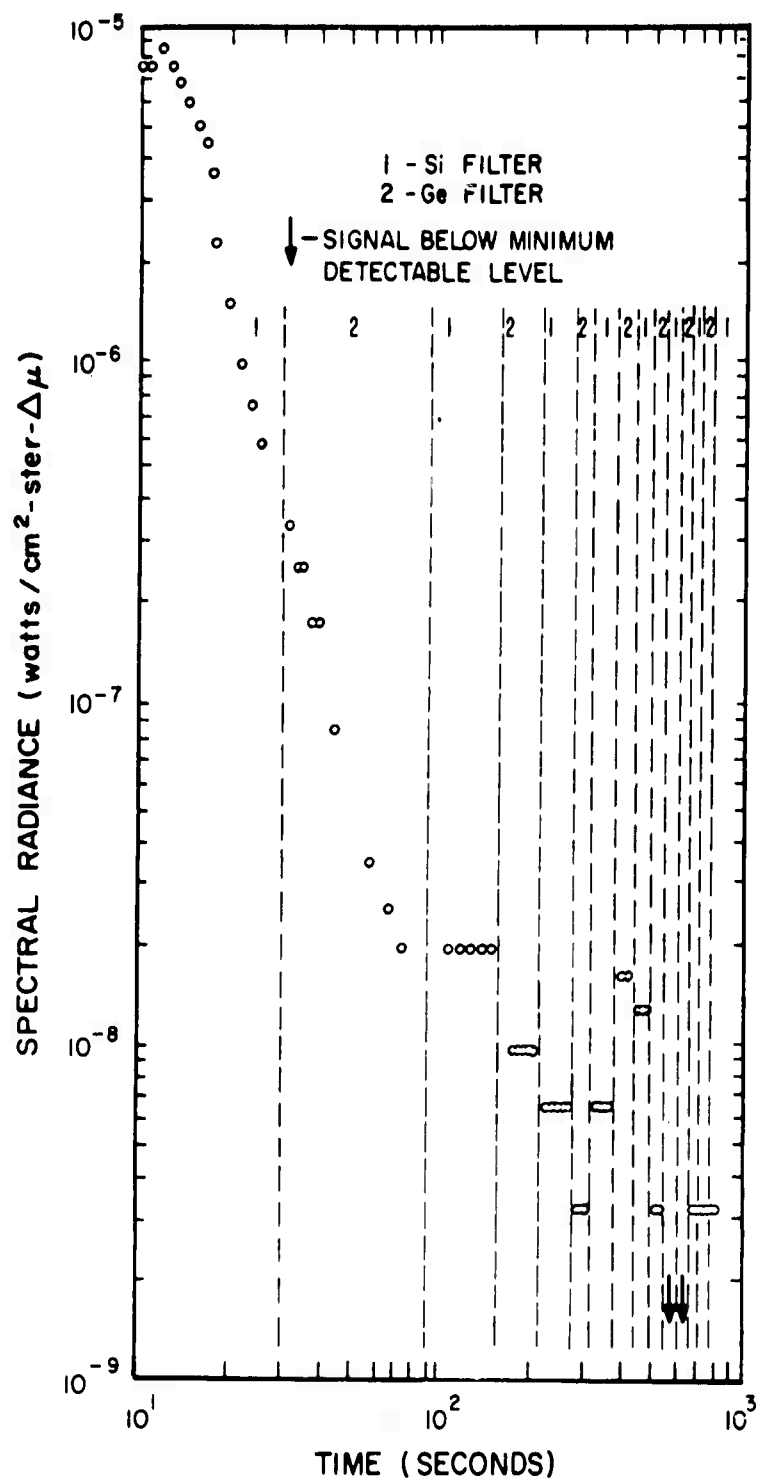


Figure 3.686 Spectral radiance, Kettle II, Tight Rope, Channel 19, late time.

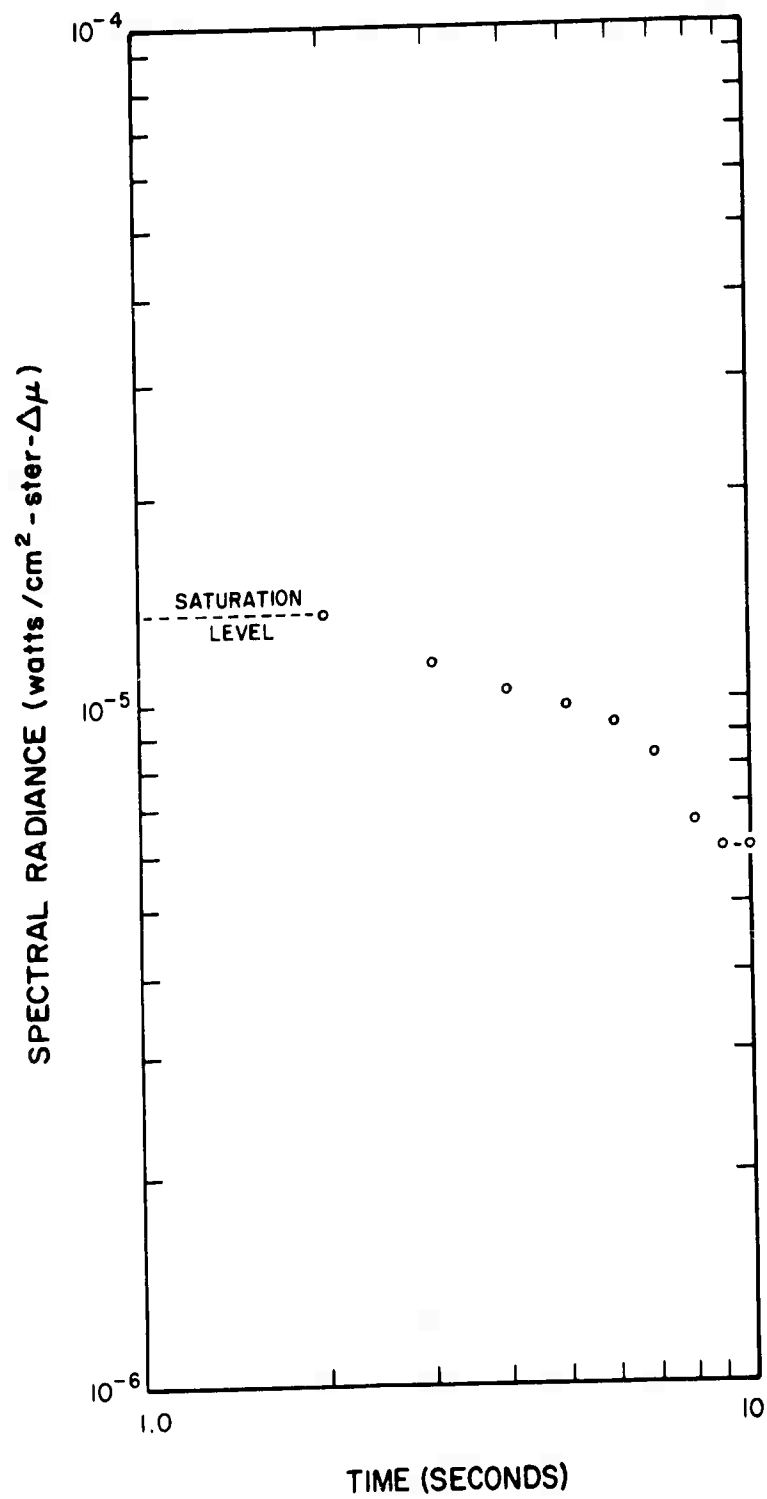


Figure 3.687 Spectral radiance, Kettle II, Tight Rope, Channel 20, early time.

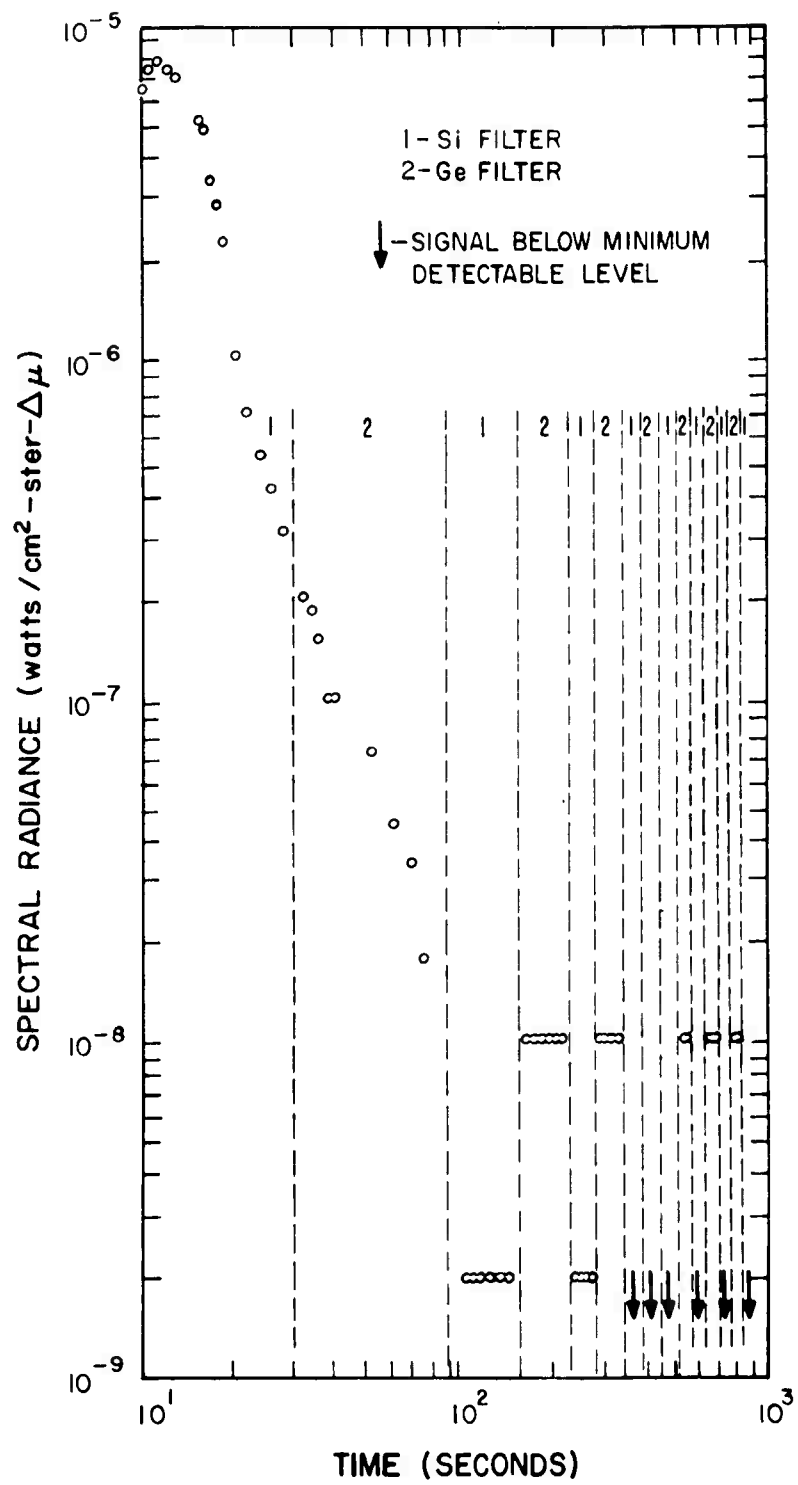


Figure 3.688 Spectral radiance, Kettle II, Tight Rope, Channel 20, late time.

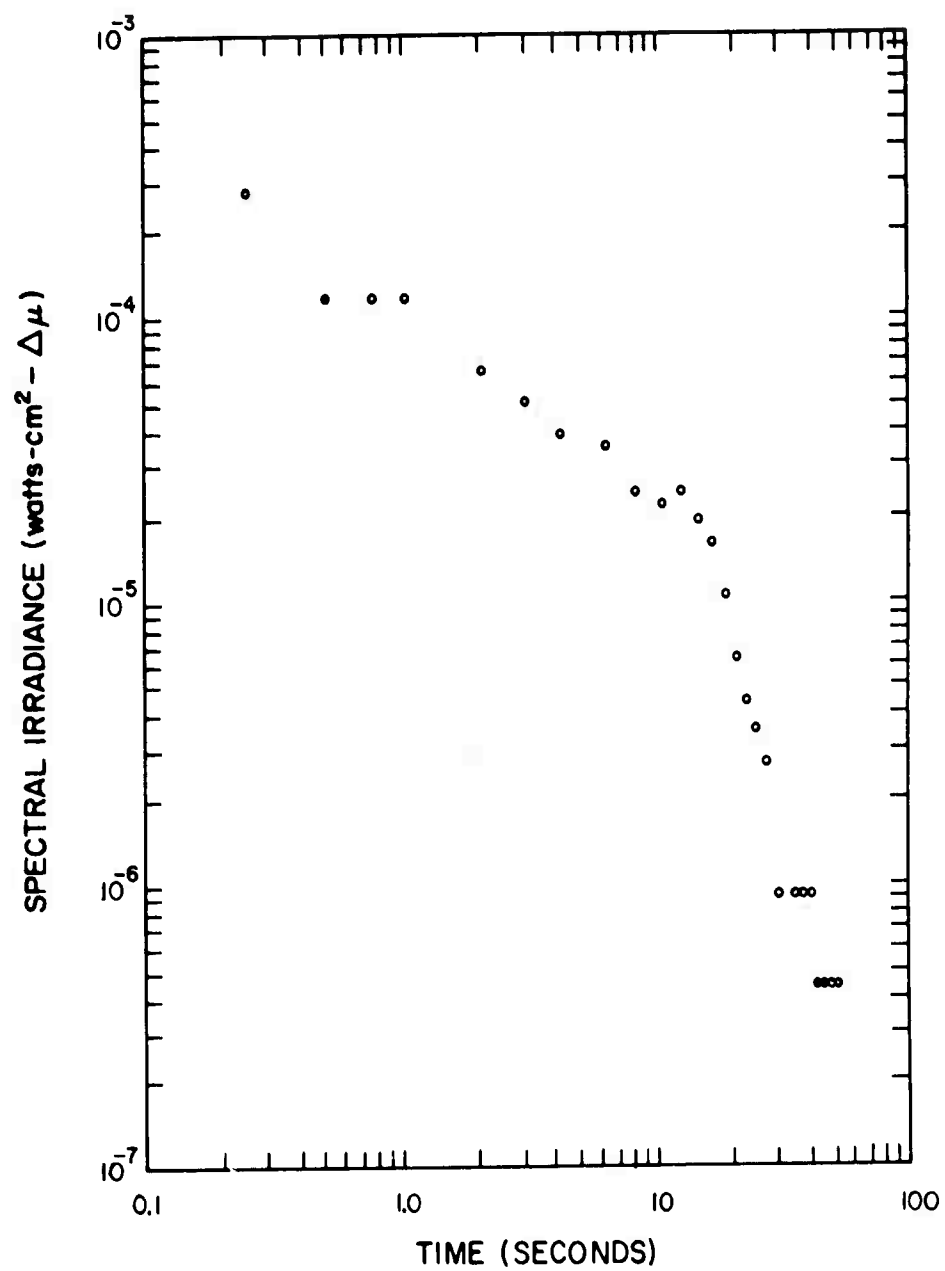


Figure 3.689 Spectral radiance, Kettle II, Tight Rope, Channel 22.

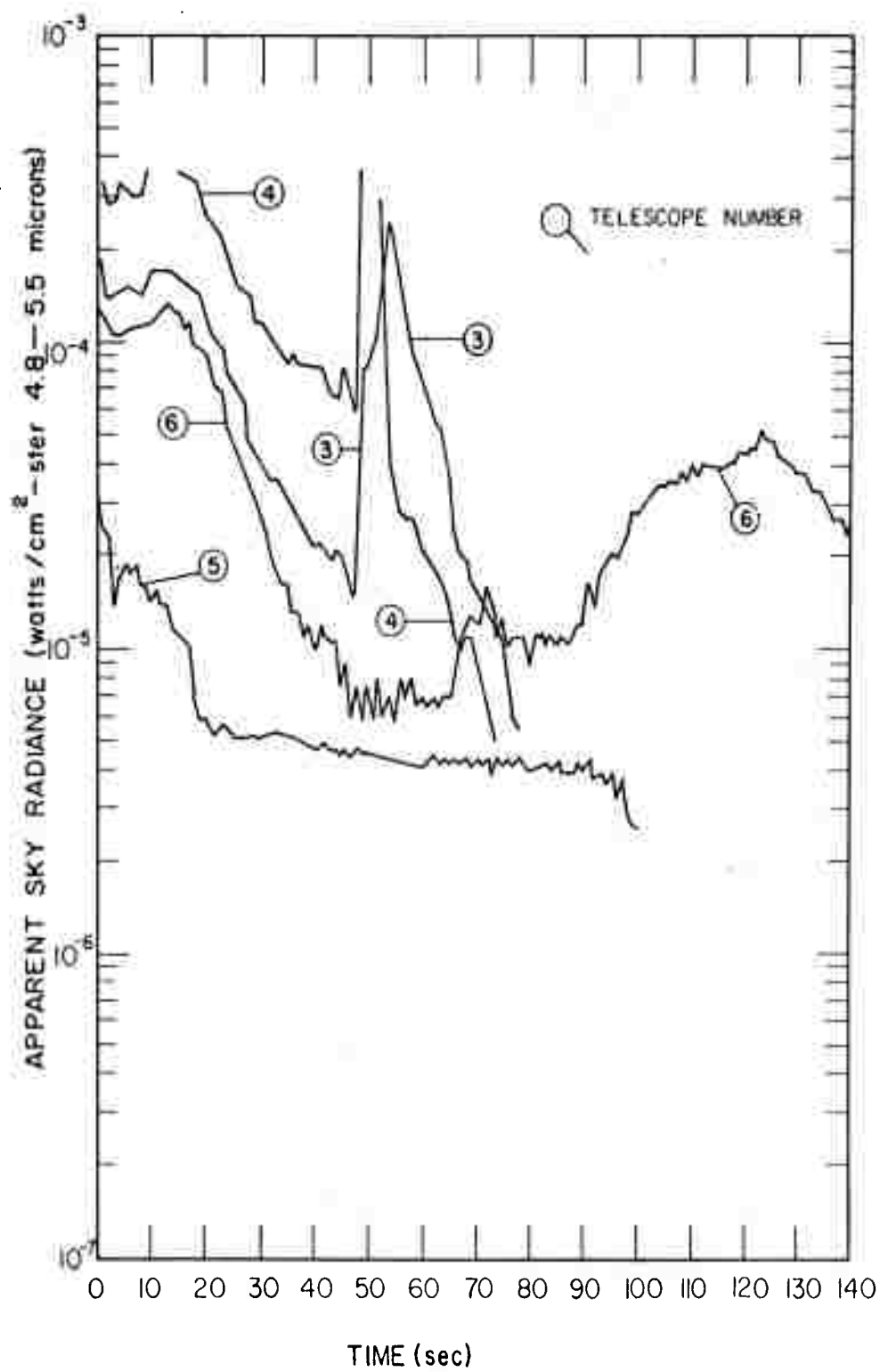


Figure 3.690 5.0-micron data, Tight Rope.

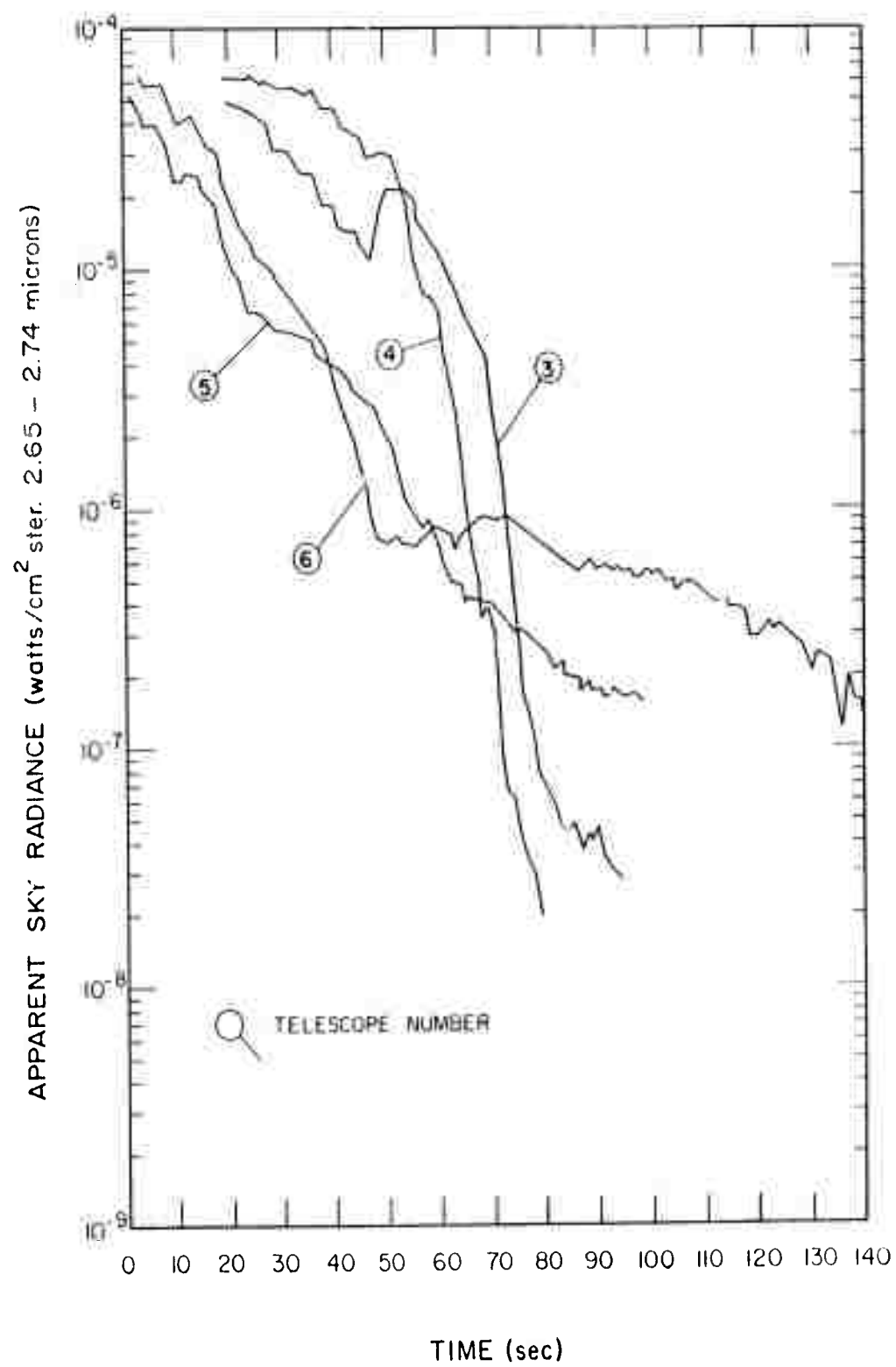


Figure 3.691 2.7-micron data, Tight Rope.

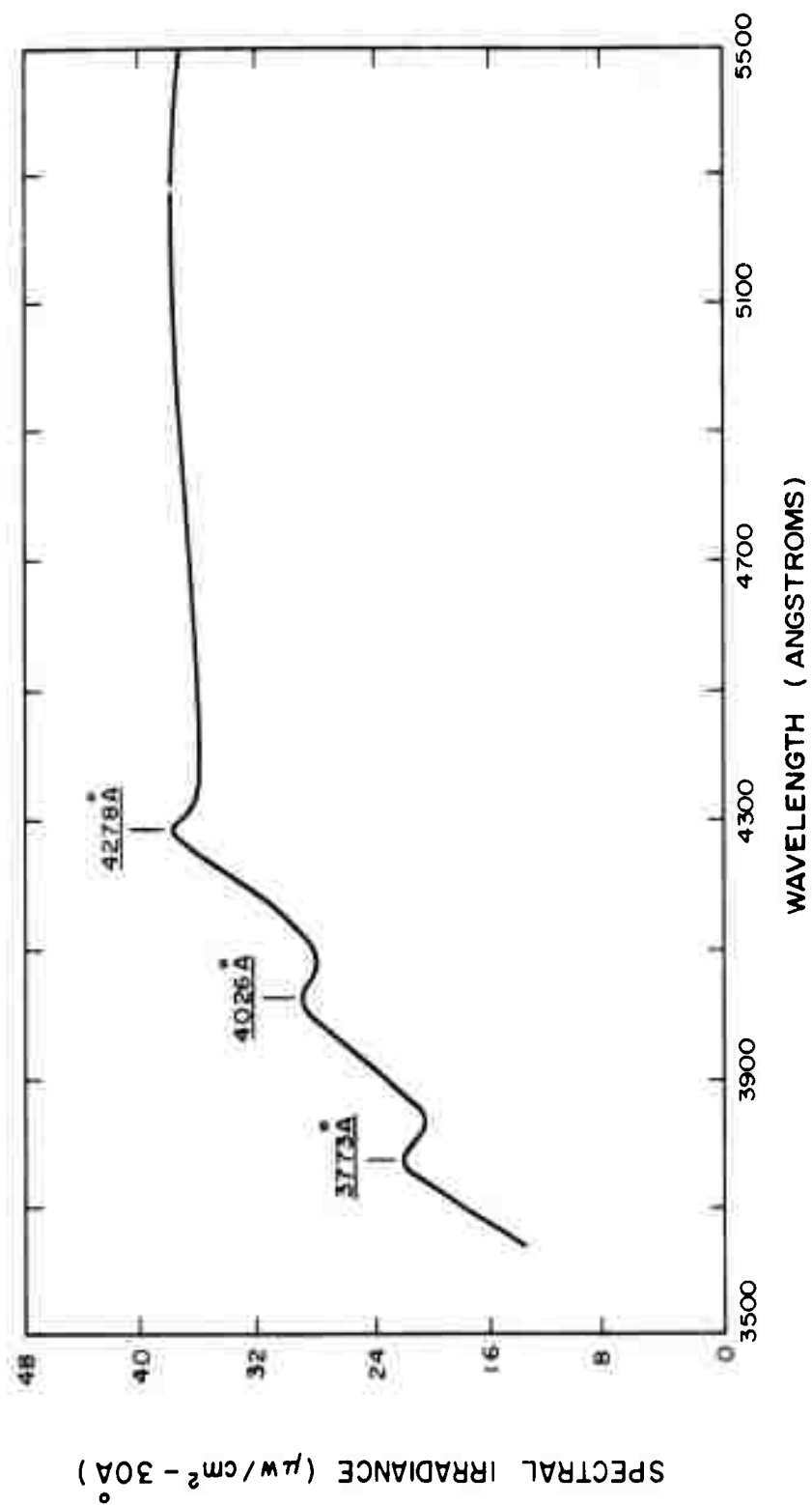


Figure 3.692 Spectrogram at H + 91 msec, Kettle I, Tight Rope.

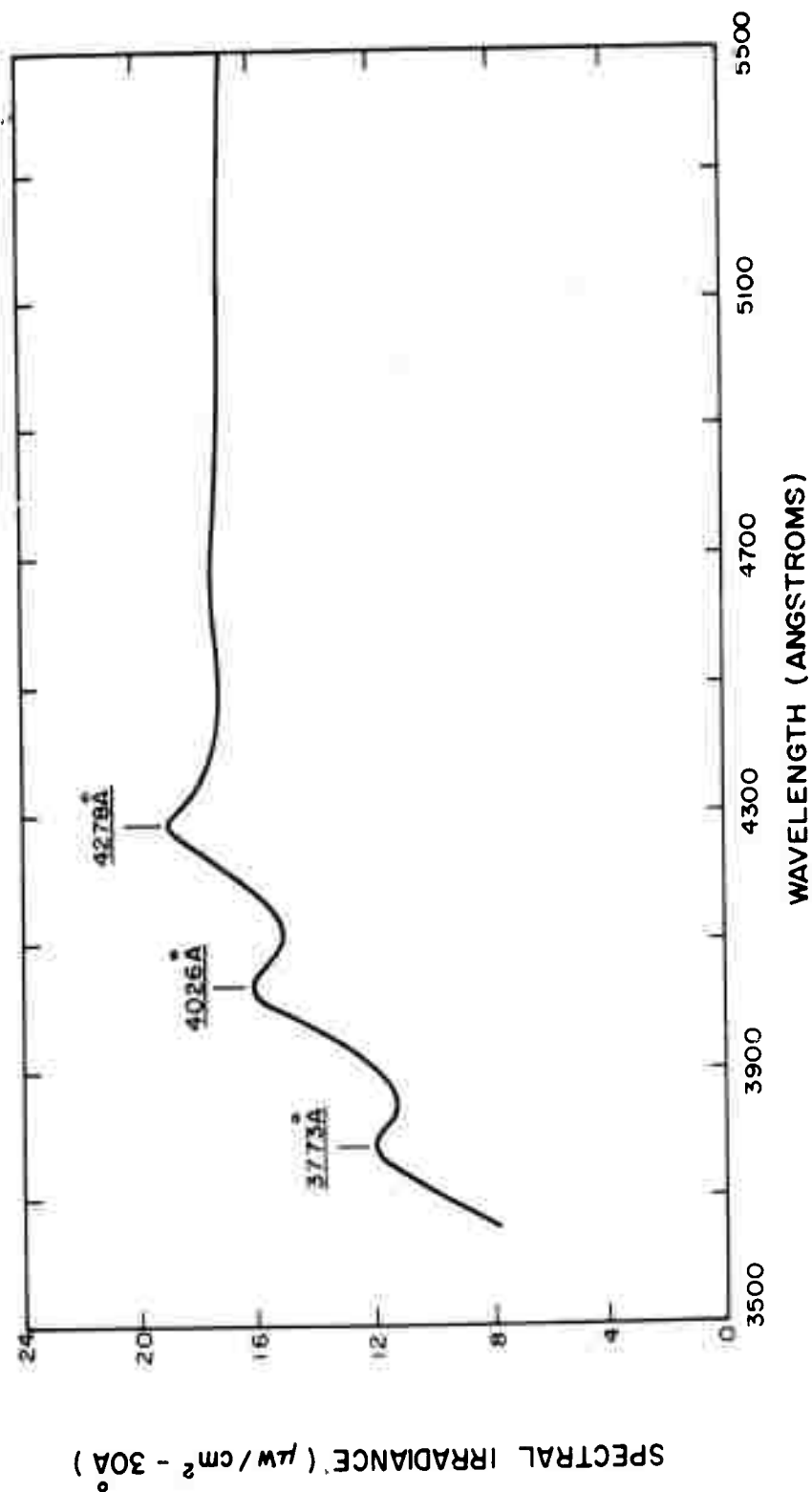


Figure 3.693 Spectrogram at H + 200 msec, Kettle I, Tight Rope.

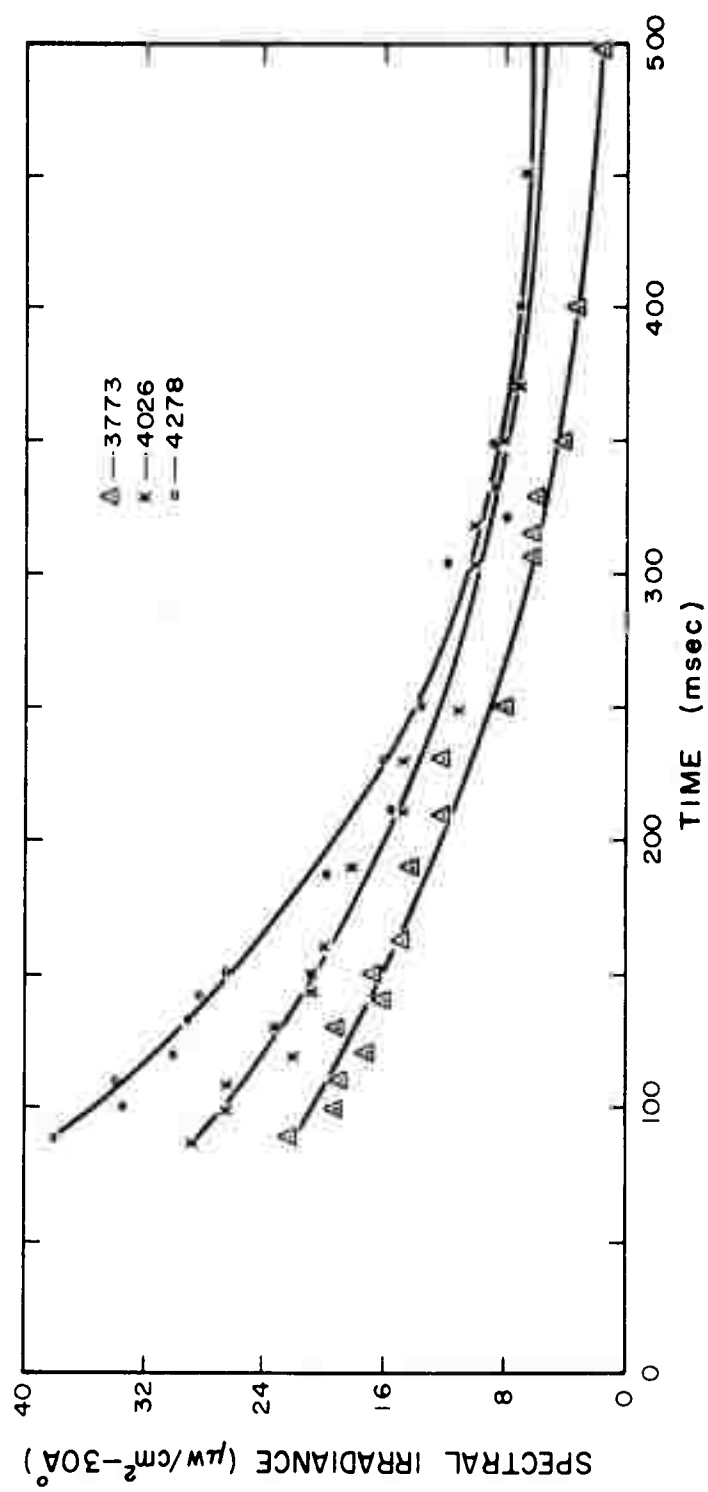


Figure 3.694 Decay of spectral irradiance, Kettle I, Tight Rope.

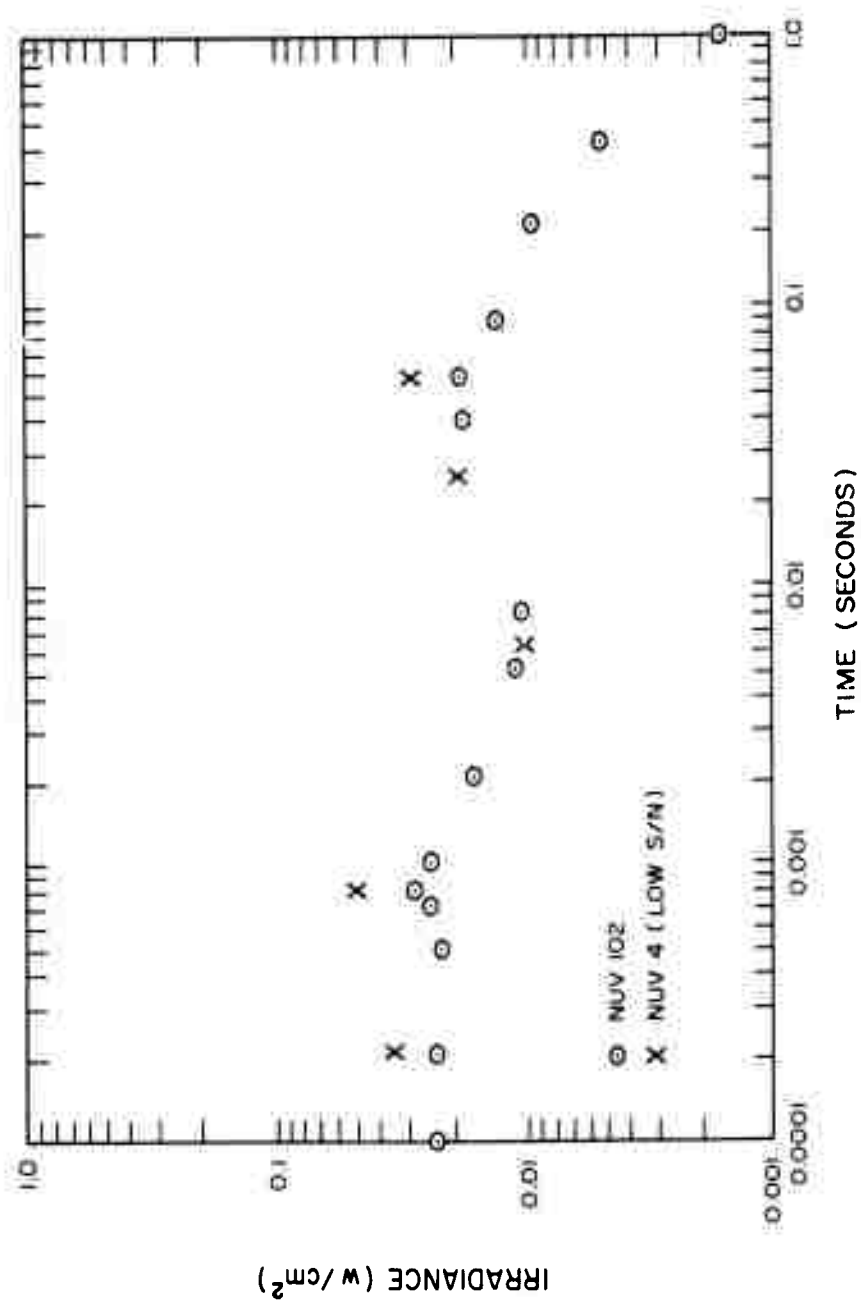


Figure 3.695 Irradiance, Kettle II, Tight Rope, in spectral region 0.29 to 0.4 μ .

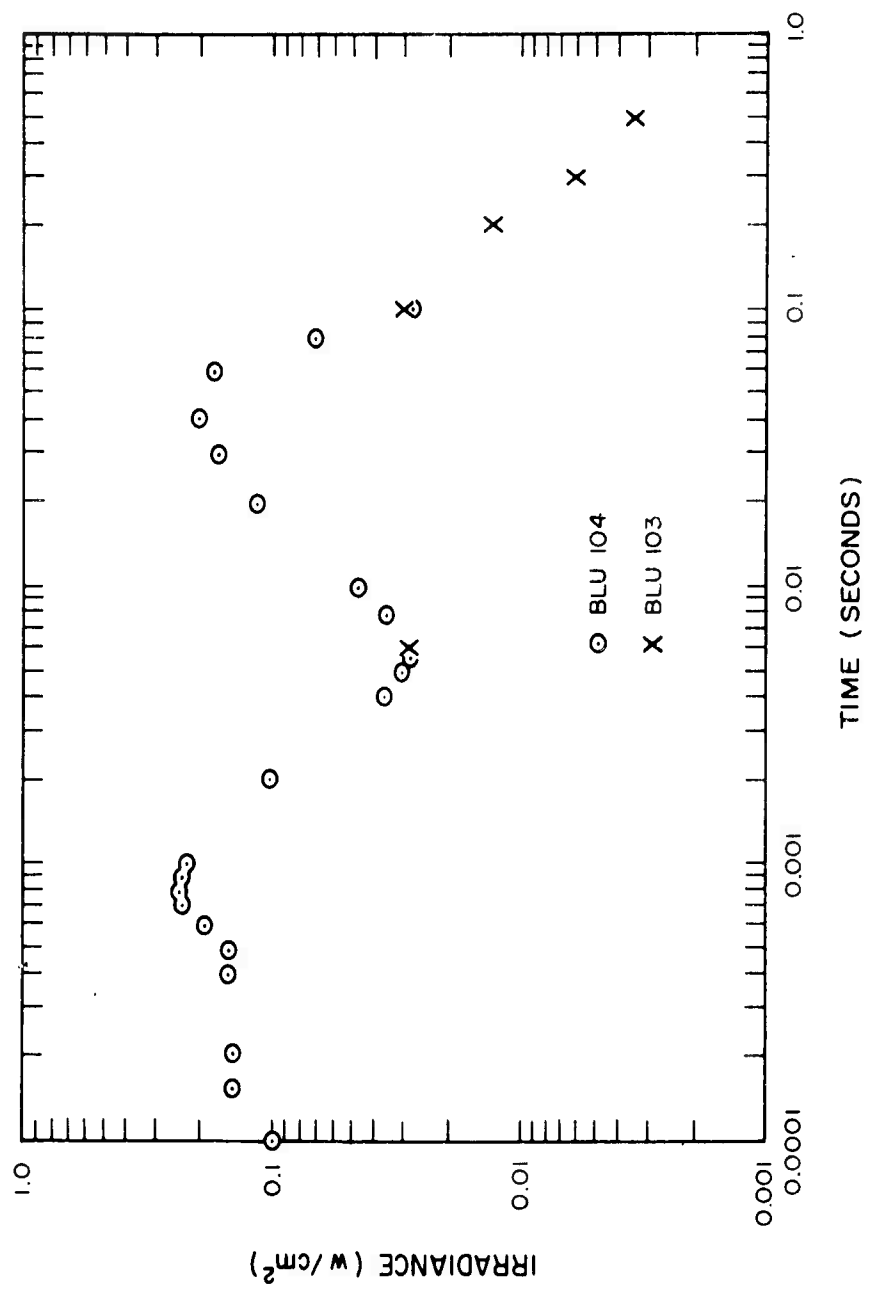


Figure 3.396 Irradiance, Kettle II, Tight Rope, in spectral region 0.4 to 0.5 μ .

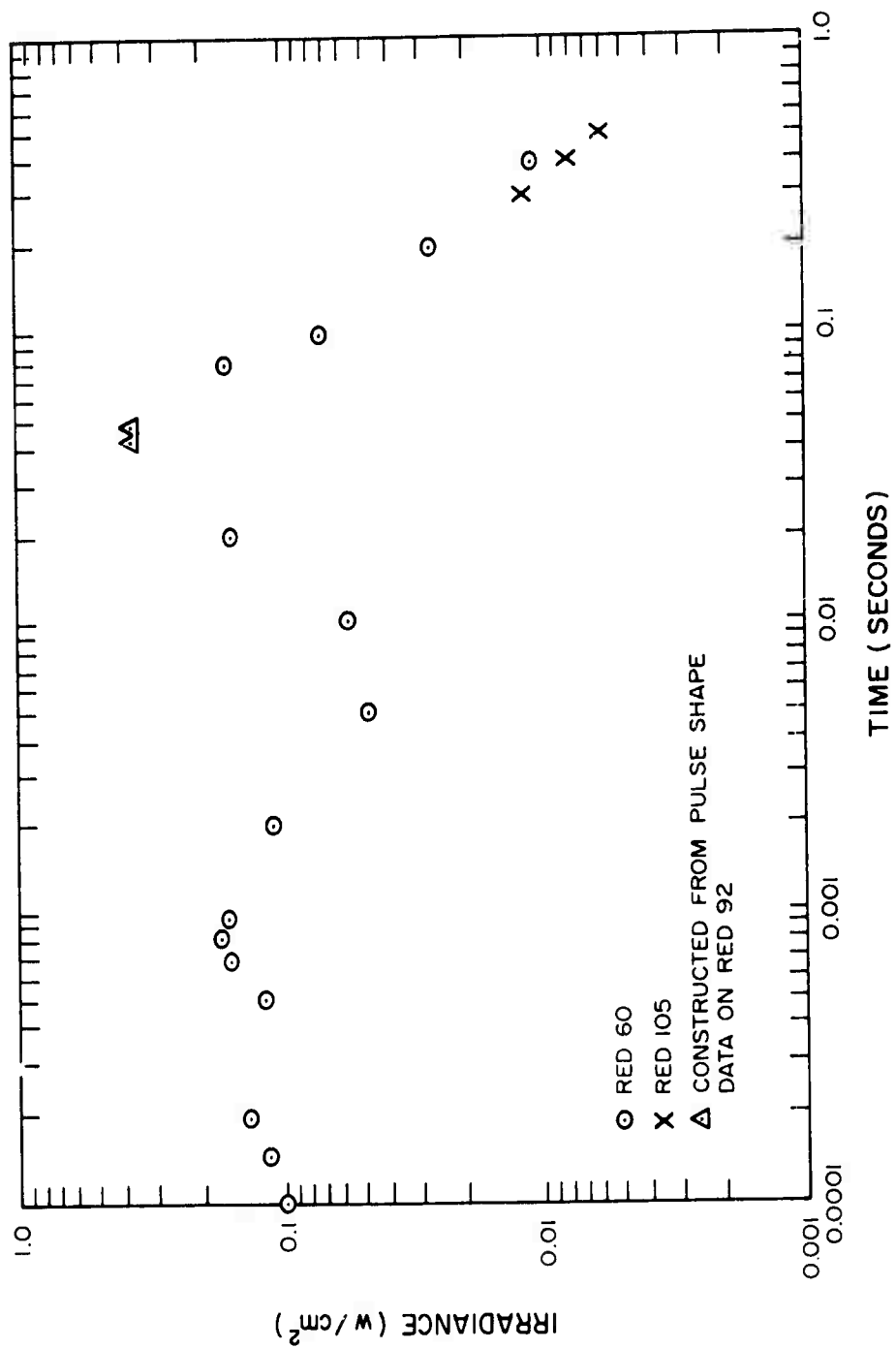


Figure 3.697 Irradiance, Kettle II, Tight Rope, in spectral region 0.5 to 0.75 μ .

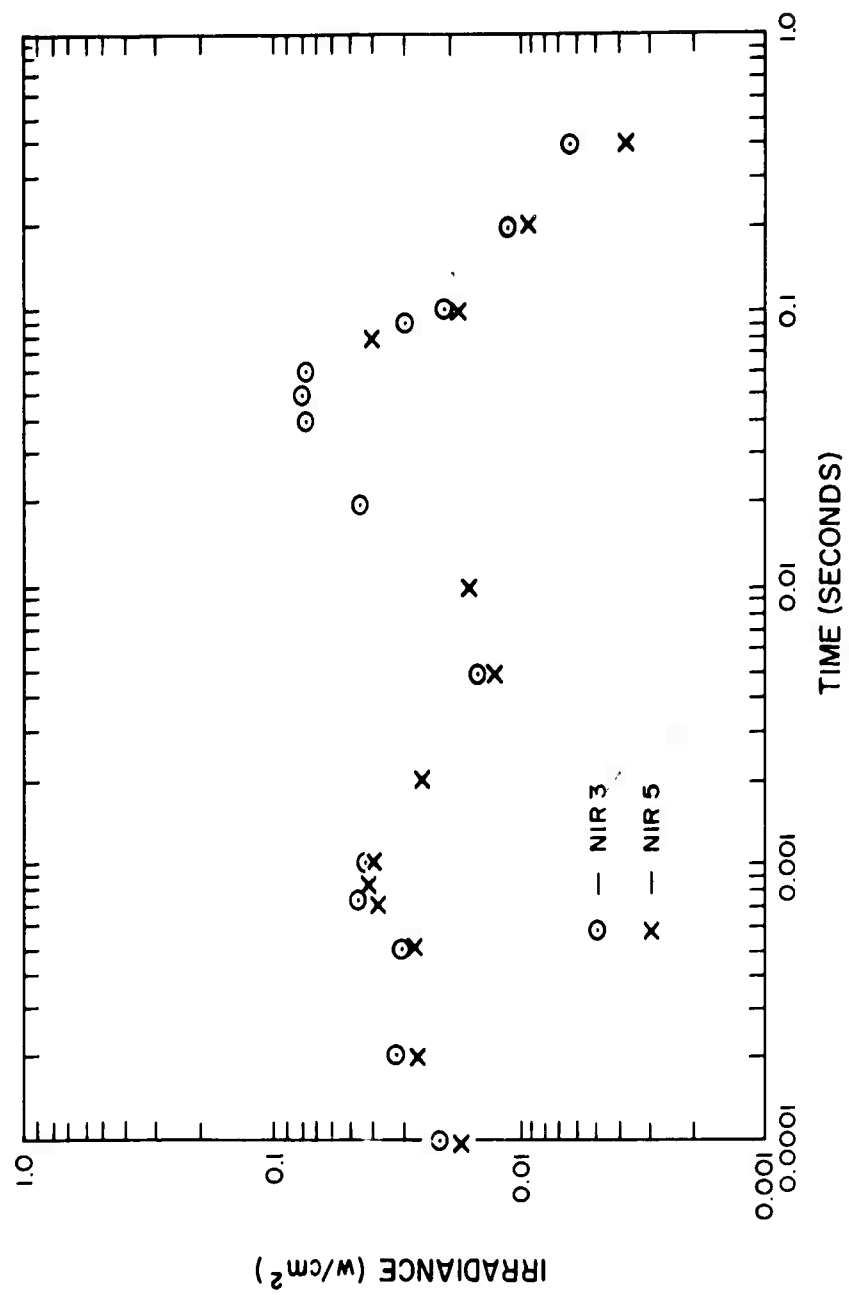


Figure 3.697 Irradiance, Kettle II, Tight Rope, in spectral region 0.75 to 1.0 μ .

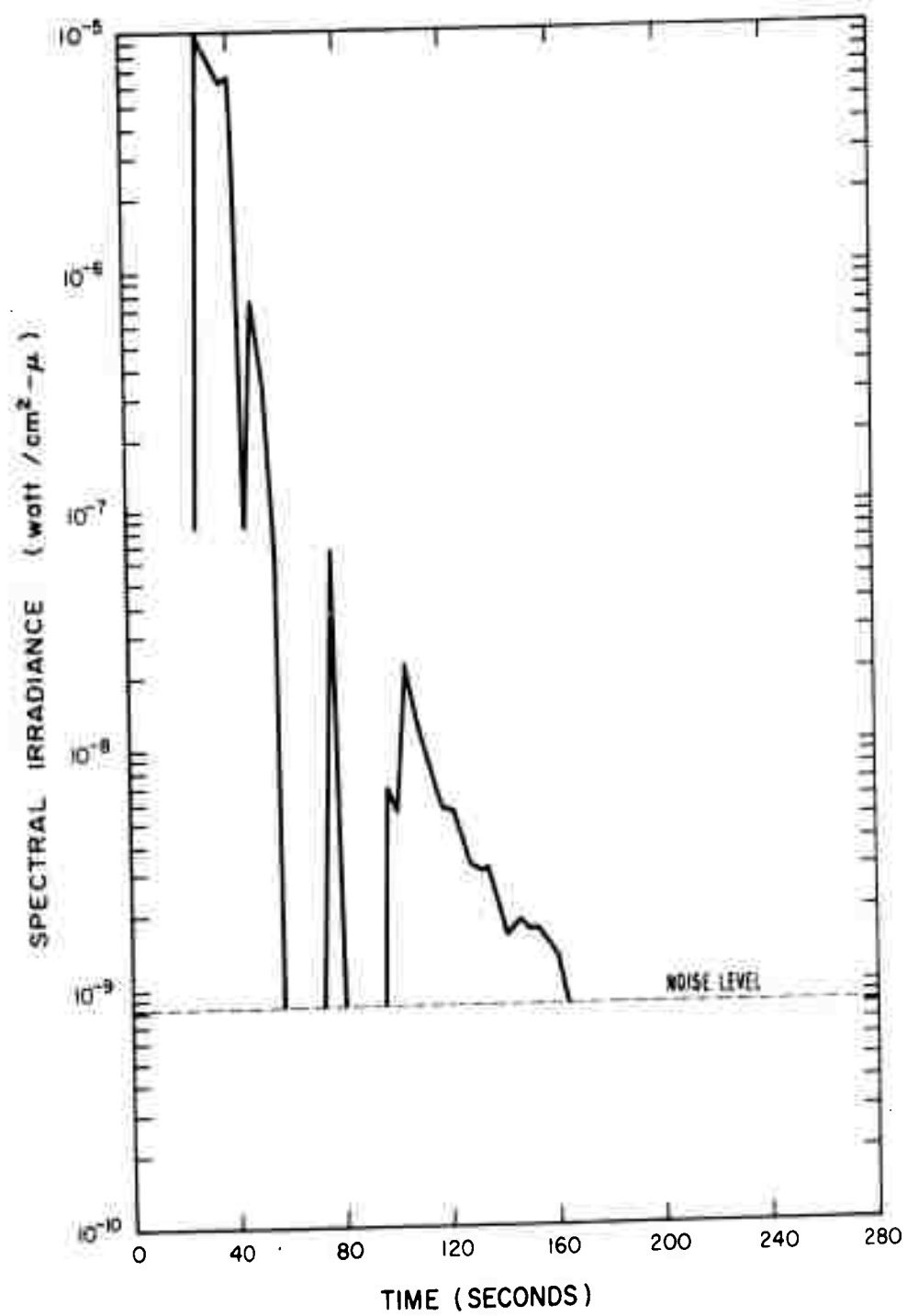


Figure 3.699 Irradiance, Kettle II, Tight Rope, in spectral region 1.55 to 1.615 μ .

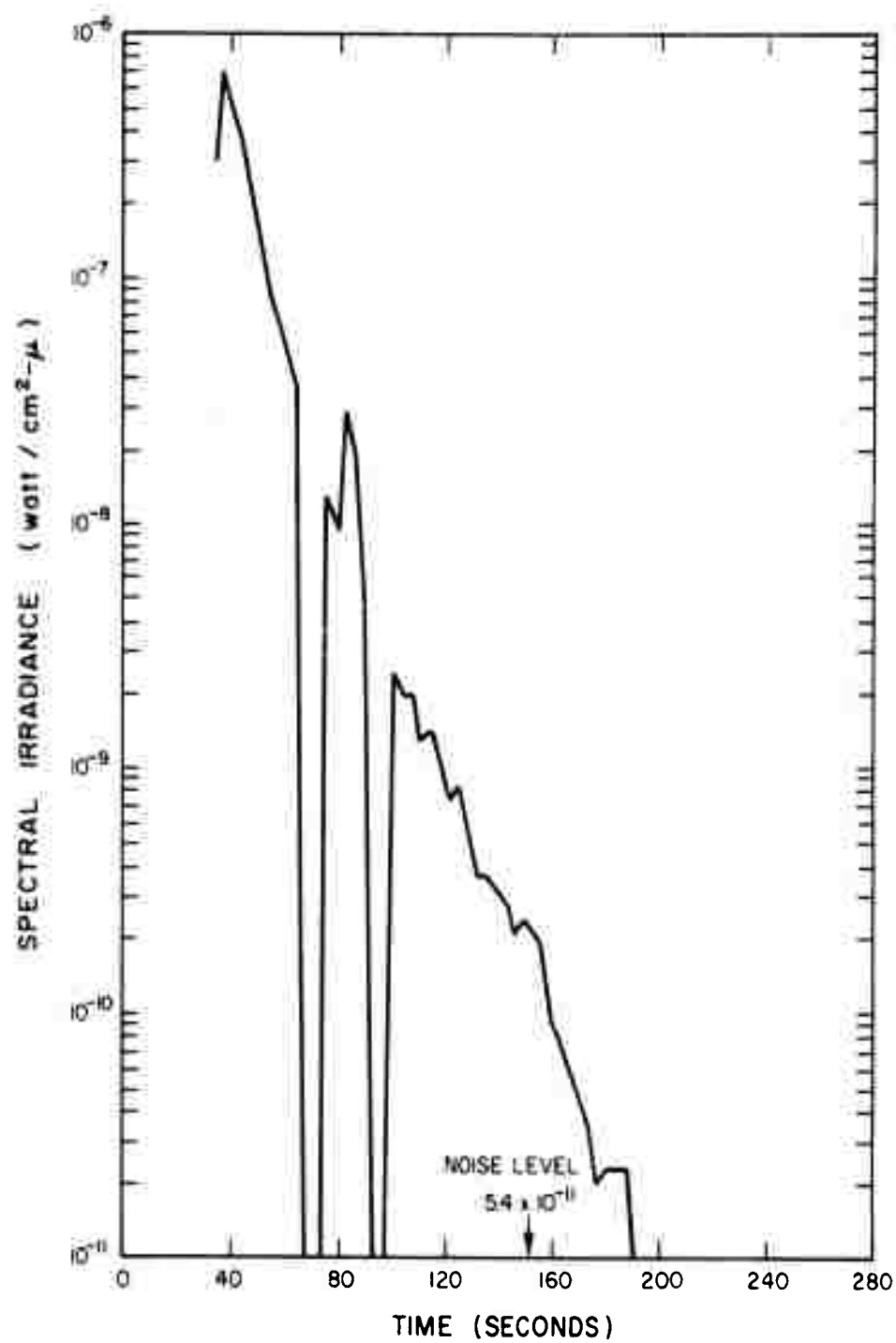


Figure 3.700 Irradiance, Kettle II, Tight Rope, in spectral region 1.62 to 1.93 μ .

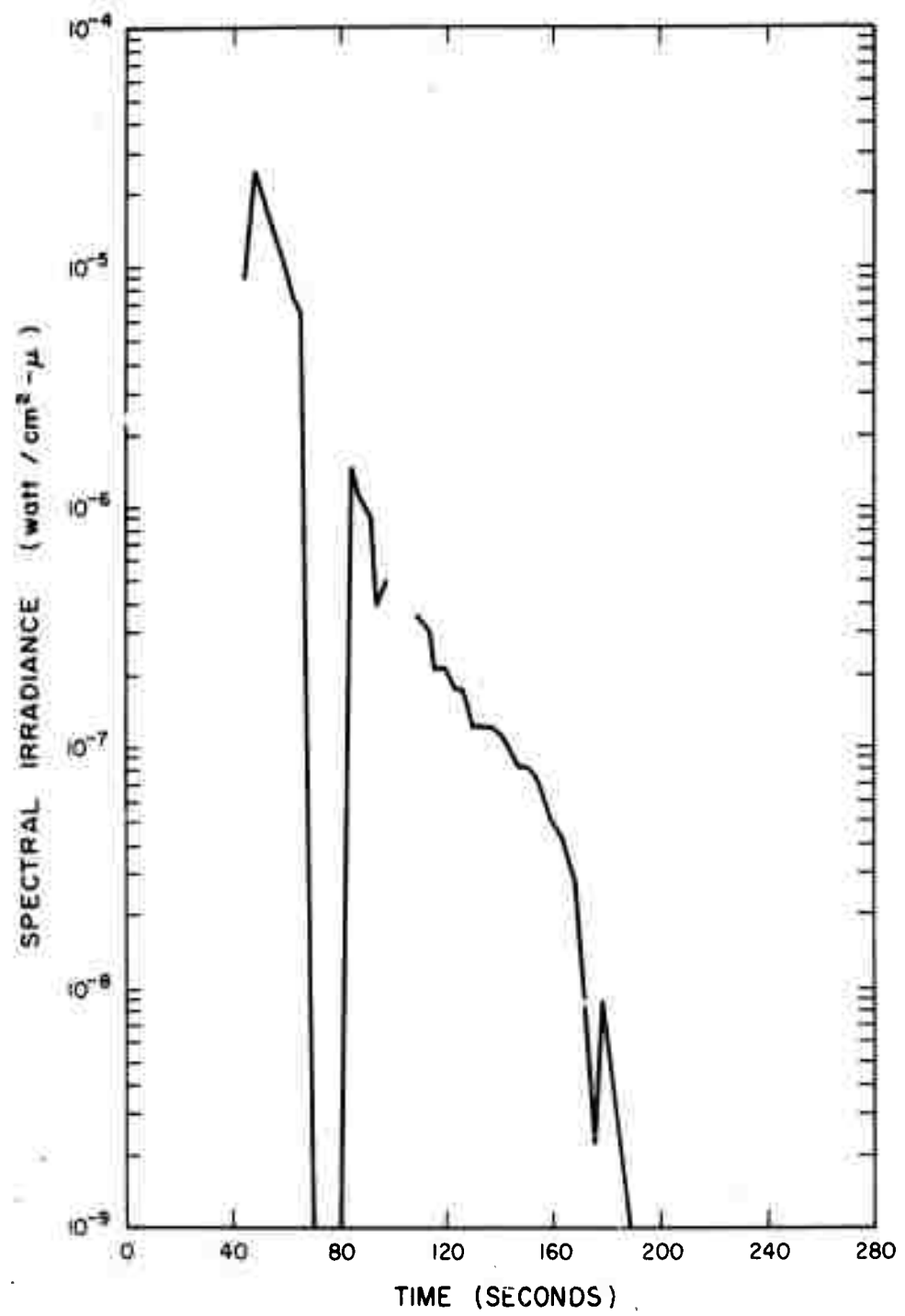


Figure 3.701 Irradiance, Kettle II, Tight Rope, in spectral region 1.87 to 2.56 μ .

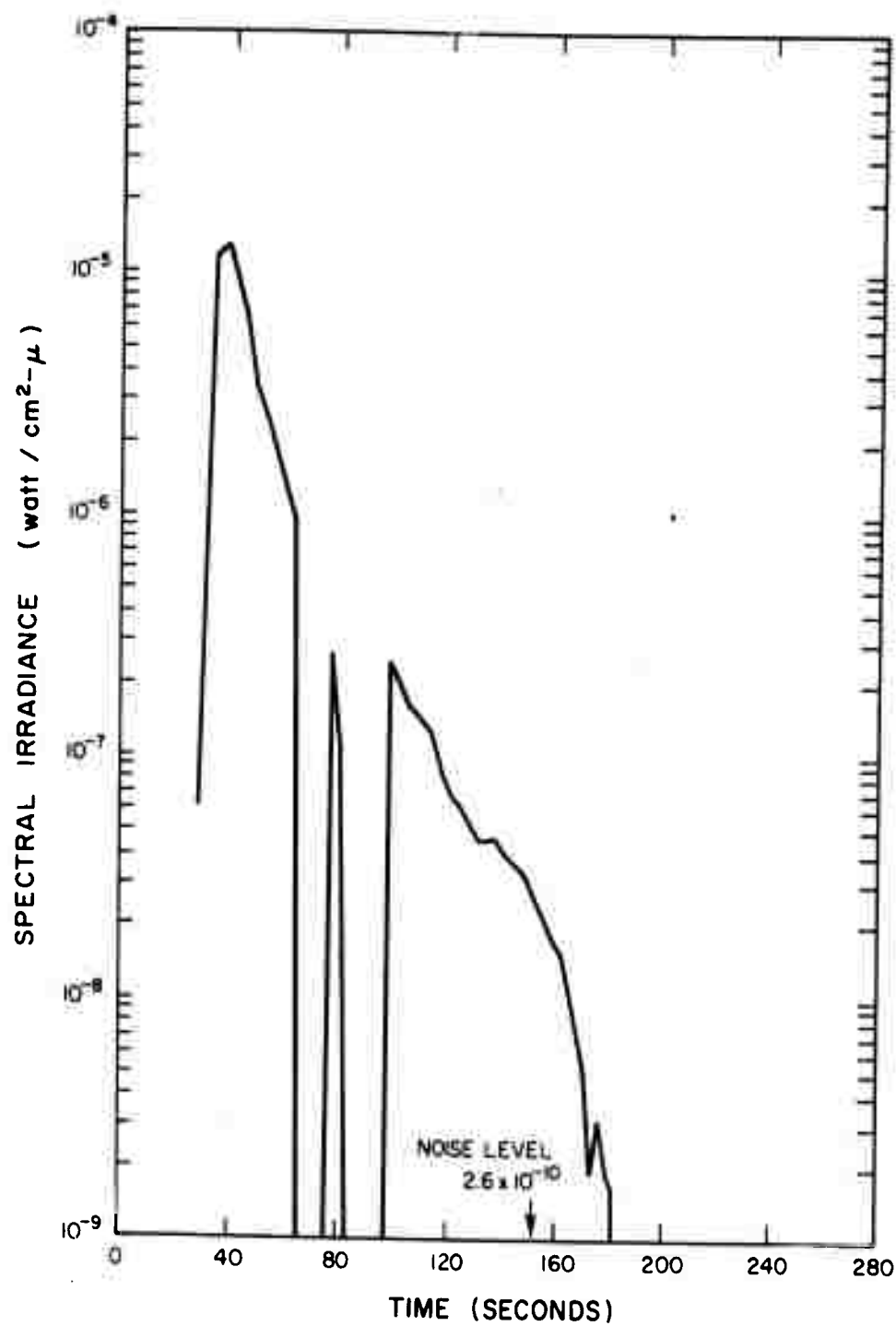


Figure 3.702 Irradiance, Kettle II, Tight Rope, in spectral region 2.15 to 2.21 μ .

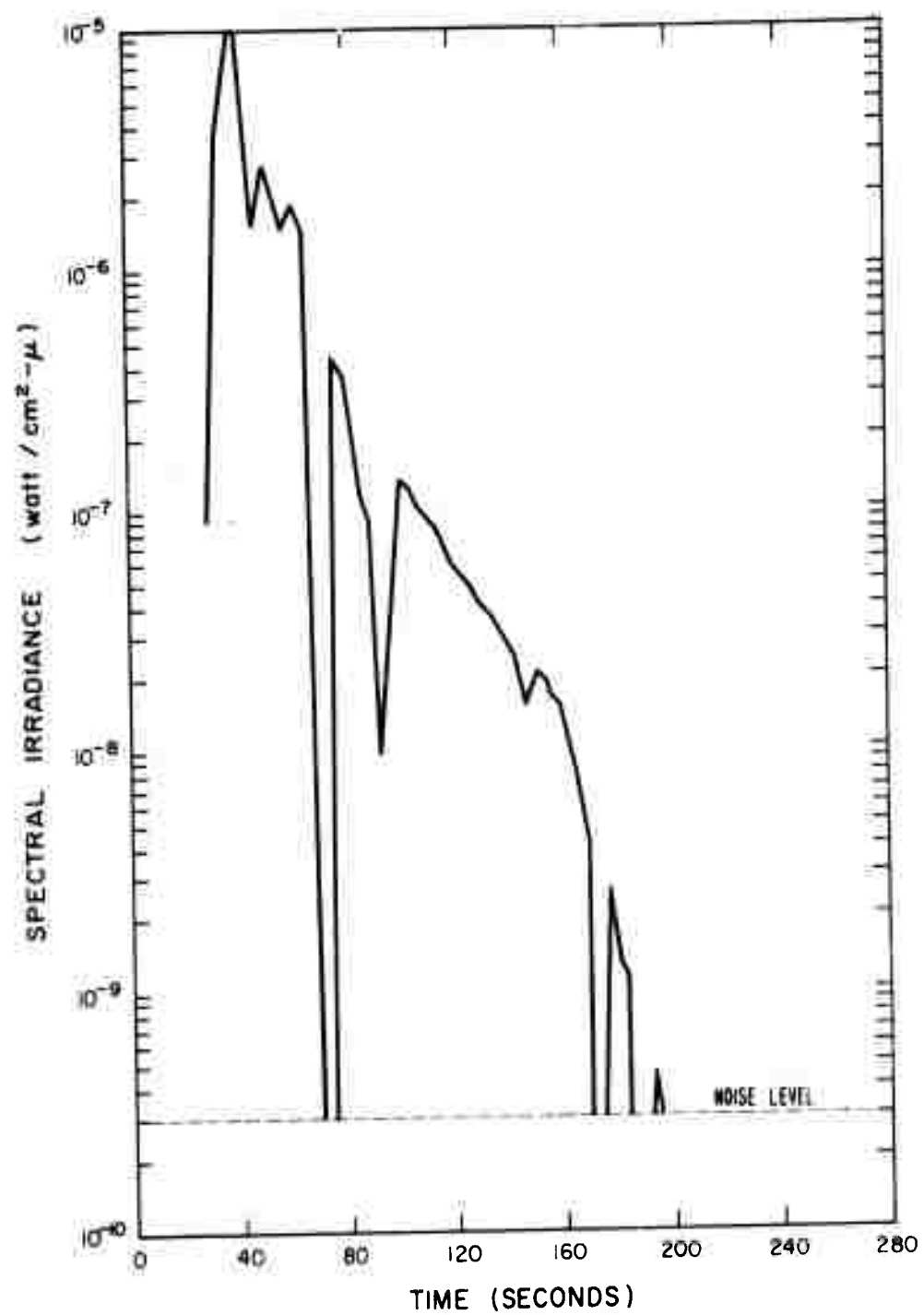


Figure 3.703 Irradiance, Kettle II, Tight Rope, in spectral region 2.645 to 2.72 μ .

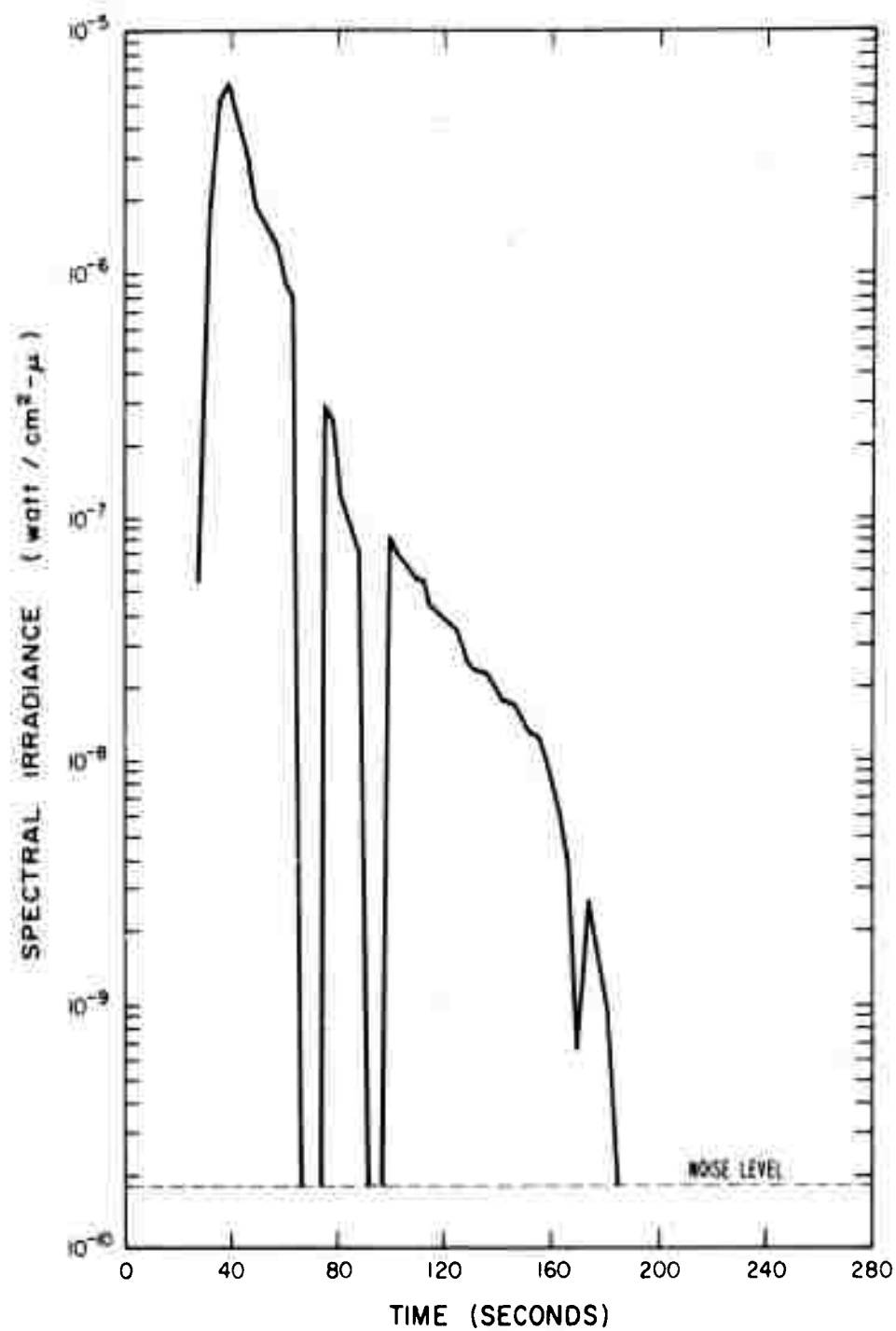


Figure 3.704 Irradiance, Kettle II, Tight Rope, in spectral region 2.65 to 2.79 μ .



Figure 3.705 PbS radiometer results from all stations, Tight Rope.

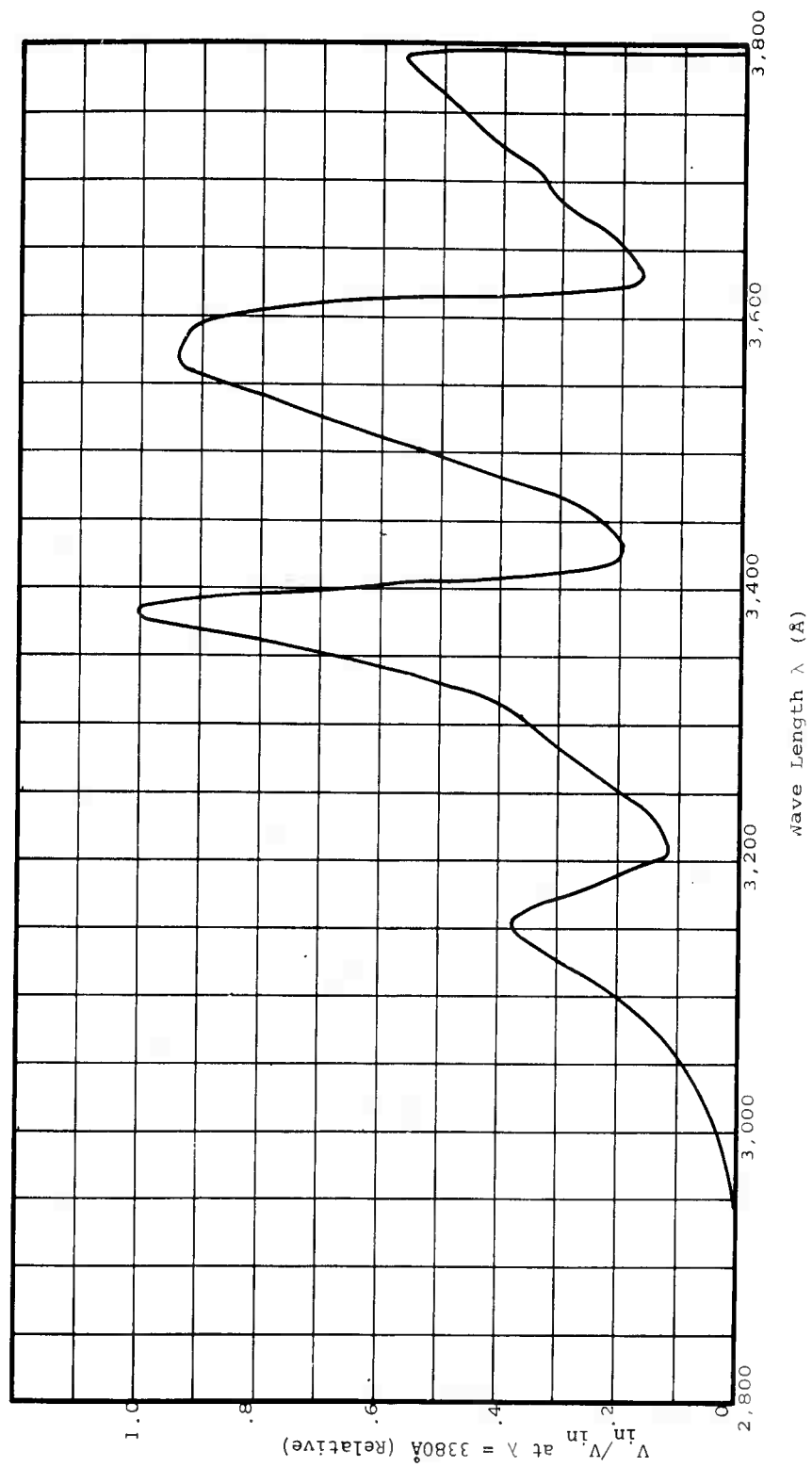
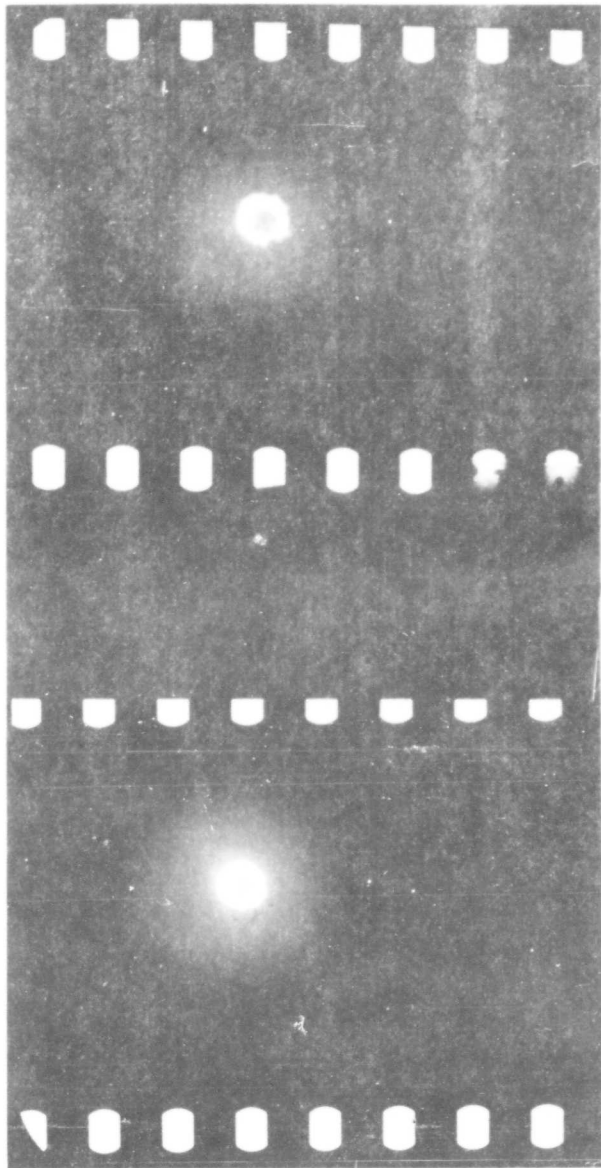


Figure 3.706 Normalized UV spectrogram at H + 88 seconds,
Kettle I, Tight Rope.



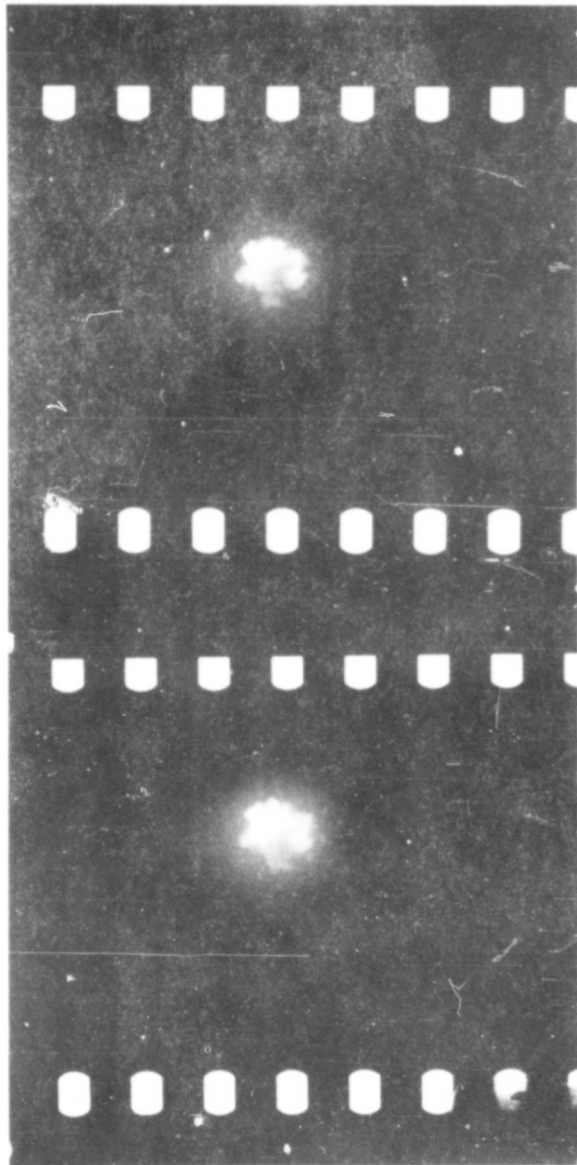
Left 30.5 to 40.5 sec • Right 41.0 to 51.0 sec
 Johnston - 21 km from burst
 T/2.0 - Super Anscochrome
 Frame Height 730

Figure 3.707 Photos from Johnston, Tight Rope,
 30.5 to 40.5 and 41.0 to 51.0 sec.



Left 138 to 163 sec-Right 168 to 193 sec
Johnston - 21 km from burst
T/2.0 - Super Anscochrome
Frame Height 730

Figure 3.708 Photos from Johnston, Tight Rope,
138 to 163 and 168 to 193 sec.



Left 258 to 283 sec-Right 288 to 313 sec
Johnston - 21 km from burst
T/2.0 - Super Anscochrome
Frame Height 730

Figure 3.709 Photos from Johnston, Tight Rope,
258 to 283 and 288 to 313 sec.

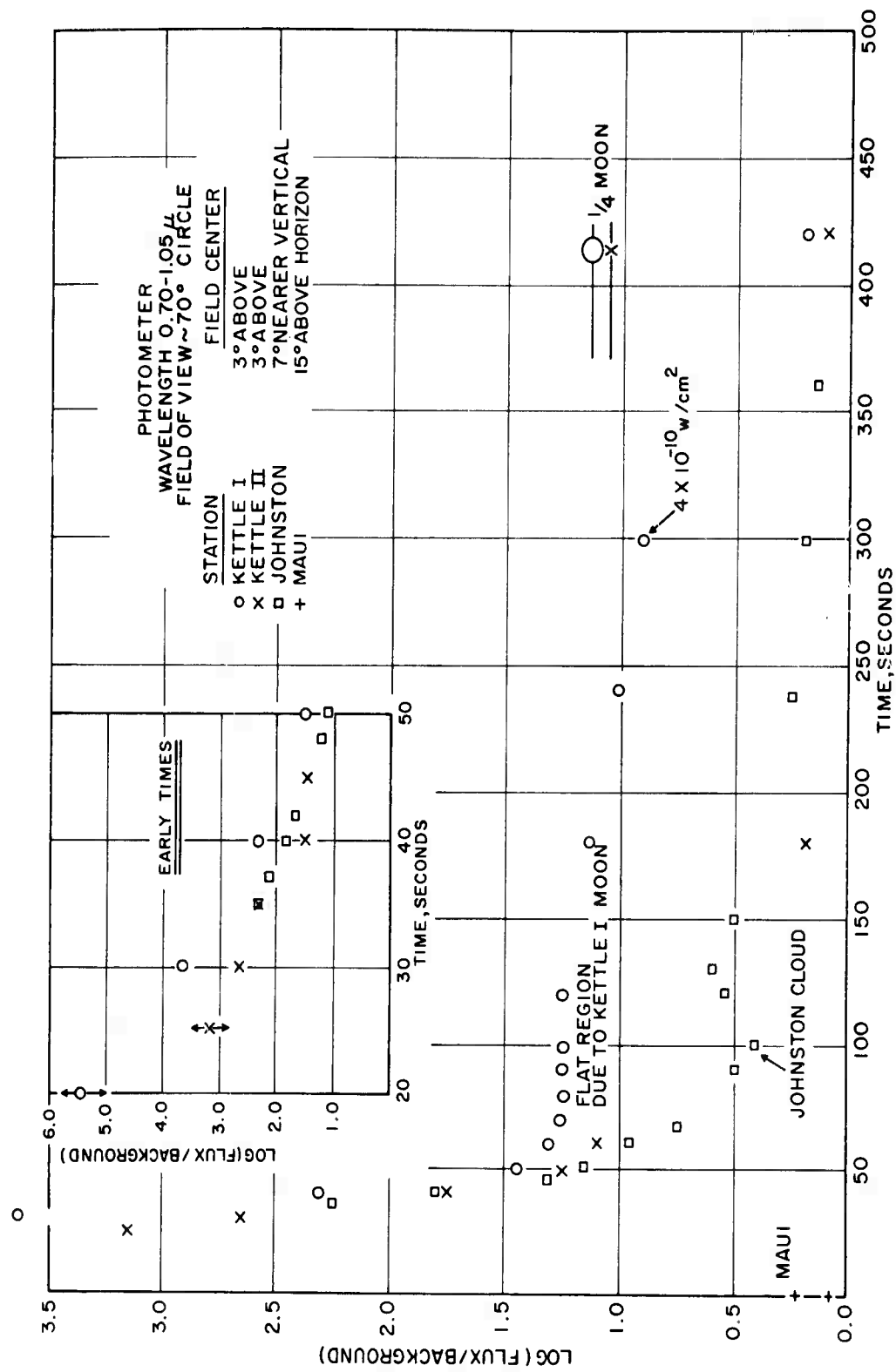


Figure 3.710 Photometer (near-IR) results from all stations, Tight Rope.

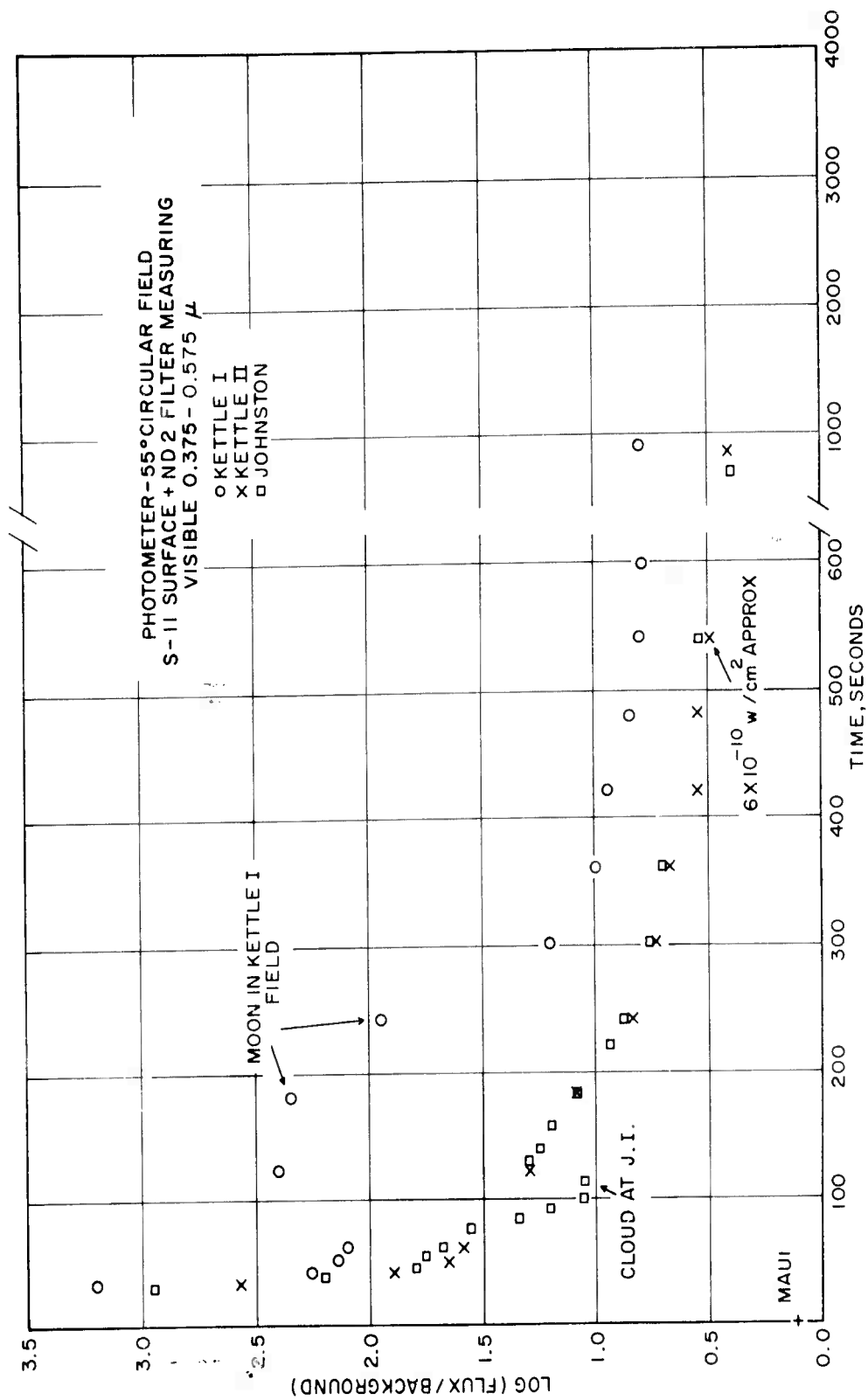


Figure 3.711 Photometer (wide-band visible) results from both aircraft and Johnston Island, Tight Rope.

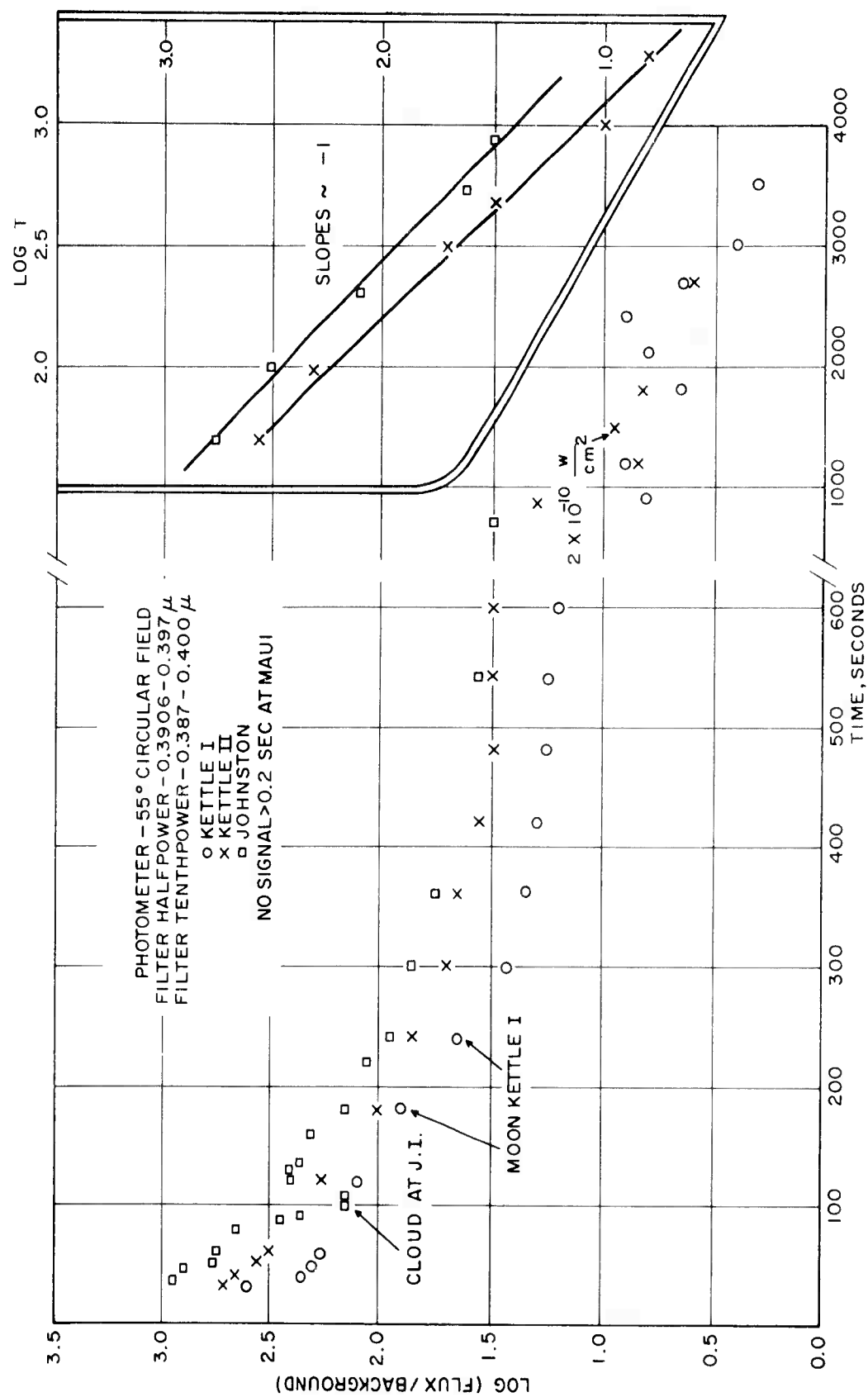


Figure 3.712 Photometer (narrow-band visible) results from all stations, Tight Rope.

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RITA M. METRO

Chief, Information Security